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EDITORIAL ANNOUNCEMENTS.

THE BRITISH AND EASTERN CONTINENTS edition of the Railroad Gazette is published each Friday at Queen Anne's Chambers, Westminster, London. It consists of most of the reading pages of the Railroad Gazette, together with additional British and foreign matter, and is issued under the name Railway Gazette.

CONTRIBUTIONS.—Subscribers and others will materially assist in making our news accurate and complete if they will send early information

of events which take place under their observation. Discussions of subjects pertaining to all departments of railroad business by men practically acquainted with them are especially desired.

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FRIDAY, MAY 18, 1906.

An expert Muck Raker—all honor to the noble woman and a few of the imitative men who have acquired this imperfect title—would find congenial work in writing the inside history of the Manhattan bridge delays which have already cost the citizens of New York and Brooklyn, before its superstructure has been begun, as much as the highest estimated cost of building it. Its Brooklyn pier is at Adams street, four or five hundred yards north of the old Brooklyn bridge, where for more than six years there has been every morning an objectionable herding of men and women. The New York pier is at Pike street, about half a mile north of the New York terminal of the Brooklyn bridge, where foreign visitors go to see the evening climax of indecency, the blackest spot on the transportation systems of America, and appearing daily in its greatest city. It is obvious that the Manhattan bridge would relieve this congestion, and yet since early in 1900, when the bridge was authorized, differences of opinion as to the form and material of the superstructure have caused a daily moral degradation and a money loss distributed among the citizens, land owners and the street car lines in Brooklyn. These differing opinions have been partly professional, and capable, as in any other engineering question, of quick settlement under normal conditions. But politics, contractor's interests and organized bodies of busybodies have resulted in suits by dummy taxpayers and the law's delay. The original plans for a 1,465 ft. wire cable suspension river span were set aside by the incoming administration of 1902. New plans for an eye-bar suspension bridge were prepared but failed to secure the approval of the board of aldermen. Another administration rejected the eye-bar plans in 1904 and again prepared wire cable plans for which bids were opened in August, 1905. At that letting the Pennsylvania Steel Company seemed to be entitled to the contract, but, as the result of a taxpayer's suit, the court declared invalid one clause which had commonly been in other city contracts, and also held that the specifications were not sufficiently definite. This year the specifications and contract forms for a wire cable bridge have been again submitted for bidding, but before the bids were opened two taxpayers' suits were begun, one apparently to prevent anything but an eye-bar bridge being built, and the other inspired by reasons not so easily understandable. We have faith in the wisdom of the Court in dealing with these dilatory undertakings to prolong the present seriously bad situation. In another column some peculiarities of the biddings are discussed, and it appears, in round figures, that the cost of the unmanufactured material for the Manhattan bridge will not exceed \$2,000,000, and the

balance of about \$5,000,000 will be for manufacture, erection, general expenses and profit. When the time for the relief of the community is so precious, the experience, capital, plant and skill of the contractor—essential elements in reliability—should be sharply considered. It requires much more than one million dollars to compensate for the possibility of further delay. This is a case where the city has no right to take any chances whatever.

The butting collision of passenger trains at Clover Creek Junction, Pa., on May 4, killing 10 persons and injuring 37, reported in the *Railroad Gazette* May 11, page 481, was due to forgetfulness on the part of the pilot of the westbound train, a passenger engineman of experience and perfectly acquainted with the road. He had an order to wait at the end of double track for the eastbound train, but did not do so. One account says that the name of the meeting point was indicated by letters ("S T"), and that the mistake was in running for another station beyond, the name of which was composed of similar letters. An officer of the road, however, is quoted as saying that the mistake was simple forgetfulness. However this may be, two points stand out clearly. Questions of forgetfulness and of mistakes or negligence of enginemen in conferring with conductors or with firemen will probably demand consideration for the next hundred years, if we continue for that length of time our present dependence on the despatching system, for there seems to be little prospect of agreement as to how to manage these things; but the two points which we refer to are so plain that there can be no difference of opinion concerning them. First, we make it a fundamental rule that the grave duty of protecting a train from butting collision shall be put upon the minds of two men, a conductor and an engineman, and then deliberately suspend that rule whenever it becomes necessary to run a train over a line with which its conductor and engineman are not familiar. The suspension is not always complete, but even a single loophole sometimes causes a collision. We must expect disasters under such practice. If dual responsibility is necessary we must enforce it; if not necessary let us abolish the rule, so that in depending on a single pilot we shall be consistent. Secondly, we make it a rule to block-signal our important lines (depending on the time-table and the despatcher on the less important), and then deliberately permit the suspension of this rule also by allowing unimportant lines to be converted at a moment's notice into important ones. The only rational rule is to establish the block system on all lines. There was some newspaper criticism of the use of telephones for sending train orders

on the Petersburg branch; but no fault was found. Moreover, this particular order was sent by telegraph.

MOTOR CARS AND LOWER PASSENGER FARES.

One result of the present tendency toward lower passenger rates, either voluntarily or under legislative compulsion, may be looked for in a heightened interest in and an added impetus to the endeavors to obtain a satisfactory motor car design with which to replace, where practicable, present unprofitable passenger train service. Just now it is gratifying to note that more attention than ever before is being given to steam car designs. A very hopeful report reaches us that a design for a flash boiler of capacity suitable for rail motor car service is nearing perfection. Oil is to be used for fuel and the one present practical difficulty is to develop a burner that will yield the requisite degree of heat. President Hill, of the Great Northern, sent an expert to Europe several months ago to make a thorough study of the motor car question over there and recommend as a result of this study a type of car for similar service in this country. This emissary recently returned and though no official report has been given out, it is understood that his conclusions have been altogether in favor of a steam car; in fact, the Burlington now has under consideration the matter of building at its Aurora shop a motor car of a design based on his recommendations. The Florida East Coast is experimenting with a Ganz car and the Erie has ordered one. A steam car is also being built for the Missouri Pacific and will soon be ready for experimental service. Following these experiments, we may expect in the near future some definite results from several different designs of steam cars to compare with the other two types—gasolene and gasolene-electric.

In considering motor car types, the point should not be overlooked that in assigning such cars to branch-line service they may be remote from the shops or repair points. Unfamiliar types or complicated designs will require special talent in case anything goes very seriously wrong. The simpler the design, the less this will hold true. In this fact, the advocates of the steam car may perceive an advantage. It would not be the mystery to the man running it or the crew aboard it that other types would undoubtedly be, because of its analogy to a locomotive. In case of a breakdown, therefore, the steam car's crew would in all likelihood be able to fix it, or at least get it into the terminal.

Reference to this phase of the matter brings up again a point which recurs in discussions of this question, the use of a light locomotive and single car. The equipment assigned to this service would in most cases be such as had outlived its usefulness in regular service and therefore, compared to an expensive motor car, would be regarded as having only a nominal first cost. Likewise, less would be expended for maintenance, so that a very material saving will have to be figured in operating costs to make the average operating officer see the wisdom of taking up the motor car proposition, especially where it involves high first costs.

MANHATTAN BRIDGE SUPERSTRUCTURE BIDS.

It is interesting to compare in detail the bids made for the Manhattan wire cable suspension bridge on August 1, 1905, and on May 7, 1906. Five bids were received at each of the two lettings. Three of the bidders at the first letting were represented at the second letting, when two new bidders appeared to take the place of the two who had dropped out. The bids, arranged in order from lowest to highest at the second letting, were as follows:

	Aug. 1, 1905.	May 7, 1906.
Ryan-Parker Const'n Co.	\$7,486,491.14	\$6,493,223.00
John Peirce Co.	7,284,739.00	6,596,638.30
General Erecting Co.	7,983,970.00	6,769,983.00
Penna. Steel Co.	7,956,712.00	7,566,191.65
Milliken Brothers	8,312,940.00	7,566,191.65
R. H. Hood Company		
King Bridge Company		
American Bridge Company		

The General Erecting Company and the Pennsylvania Steel Company are bracketed together because it is commonly thought that the Pennsylvania, to whom the contract had been awarded at the first letting, is represented in the General Erecting Company at the second letting, leaving itself free to prosecute its suit for damages against the city because the contract awarded in August, 1905, had not been executed.

There are about 42,000 tons of steel to be made and erected as against about 45,000 tons contracted for six or eight years ago for the Williamsburg bridge and approaches, and the work is of such a

Items.	Engineer's est. of quantities, lbs.	Ryan-Parker Const'n Co.			John Peirce Company.			General Erecting Company.			Milliken Brothers.			The American Bridge Co.		
		Quantity.	Unit price.	Total.	Quantity.	Unit price.	Total.	Quantity.	Unit price.	Total.	Quantity.	Unit price.	Total.	Quantity.	Unit price.	Total.
Anchorage material, f. o. b. bridge site:	Riveted work	1,335,600	\$0.08	\$106,880	1,300,000	\$0.05	\$65,000	1,335,600	\$0.0833	\$111,153	1,335,600	\$0.04	\$53,422	1,312,000	\$0.0475	\$62,320
	Steel castings	3,732,000	.08	298,560	3,750,000	.05	187,500	3,732,000	.0633	236,736	3,732,000	.042	\$156,816	3,728,000	.05	186,400
	Iron castings	307,500	.05	15,375	305,000	.05	15,250	307,500	.0633	19,373	307,500	.045	\$13,763	304,000	.05	15,200
	Brass castings	1,500	.10	150	1,500	.10	150	1,500	.0788	118	1,500	.085	128	1,500	.10	150
	Brass	400	.40	160	400	.40	160	400	.5710	228	400	.400	160	400	.50	200
	Iron castings	18,500	.08	1,480	20,000	.10	2,000	18,500	.0619	1,145	18,500	.0381	705	22,000	.10	2,200
	Lead															
	Lead fillers															
	Lead															
	Lead fillers															
Towers:	Riveted work including architectural metal work	21,452,000	.08	1,733,600	21,300,000	.0744	1,584,720	21,339,800	.0601	1,280,164	21,339,800	.0735	1,575,893	22,376,000	.0825	1,846,020
	Steel castings	3,385,200	.09	304,740	3,355,000	.09	301,950	3,318,300	.0633	209,303	3,318,300	.0746	247,455	3,429,000	.1025	351,473
	Iron castings	189,100	.08	15,128	189,100	.09	17,019	189,100	.1238	23,410	189,100	.0665	12,532	616,000	.14	86,240
	Concrete, mortar, etc., per cu. yd.	930	10.00	9,300	930	12.00	11,160	930	11.25	10,463	930	10.80	10,044	950	15.00	14,250
	Cables, suspenders, etc., structural steel	30,200	.10	3,020	30,200	.06	1,812	30,000	.1052	3,156	30,200	.0564	1,703	18,000	.0825	1,485
	Suspenders, hand ropes, etc.	12,531,600	.125	1,566,450	12,536,200	.12	1,504,344	12,536,000	.1429	1,811,394	12,536,000	.142	1,848,212	12,842,000	.140	1,797,880
	Steel castings, including cable bands, strand, shoes, anchorage saddles, rollers, etc.	1,744,600	.09	156,960	1,744,600	.09	157,014	1,744,600	.1283	223,915	1,744,600	.1094	190,744	1,863,000	.155	288,765
	Iron castings	54,500	.10	5,450	54,500	.089	4,850	55,000	.1069	5,880	54,500	.094	5,121	52,000	.1275	6,620
	Brass castings	383,000	.09	34,470	383,000	.09	34,470	383,000	.1080	41,364	383,000	.103	39,453	383,000	.1275	48,825
	Brass	12,000	.50	6,000	12,000	.50	6,000	12,000	.50	6,000	12,000	.50	6,000	12,000	.50	6,000
Suspended superstructure:	Steel castings, including cable bands, strand, shoes, anchorage saddles, rollers, etc.	1,744,600	.09	156,960	1,744,600	.09	157,014	1,744,600	.1283	223,915	1,744,600	.1094	190,744	1,863,000	.155	288,765
	Iron castings	54,500	.10	5,450	54,500	.089	4,850	55,000	.1069	5,880	54,500	.094	5,121	52,000	.1275	6,620
	Brass castings	383,000	.09	34,470	383,000	.09	34,470	383,000	.1080	41,364	383,000	.103	39,453	383,000	.1275	48,825
	Brass	12,000	.50	6,000	12,000	.50	6,000	12,000	.50	6,000	12,000	.50	6,000	12,000	.50	6,000
	Zinc for suspender sockets	2,200	.50	1,100	2,200	.50	1,100	2,200	.50	1,100	2,200	.50	1,100	2,200	.50	1,100
	Lead fillers	7,400	.10	740	7,400	.10	740	7,400	.1547	1,135	7,400	.100	740	7,400	.10	740
	Nickel-steel riveted work	16,247,400	.06	974,844	16,400,000	.08	1,312,000	16,247,000	.0759	1,233,147	16,247,000	.079	1,283,124	16,541,000	.10	1,654,100
	Medium carbon-steel riveted work	21,049,800	.05	1,052,490	21,100,000	.055	1,160,500	21,050,000	.0530	1,117,750	21,050,000	.057	1,209,350	21,632,000	.0785	1,696,542
	Iron castings	41,900	.05	2,095	41,900	.05	2,095	42,000	.0530	2,226	42,000	.056	2,352	42,000	.05	2,100
	Brass	32,200	.05	1,610	32,200	.05	1,610	32,200	.0698	2,254	32,200	.056	1,803	32,200	.05	1,610
Inspection (unit price \$1.20 per net ton)	Inspection	41,684	1.20	49,981	41,684	1.20	49,981	41,684	1.20	49,981	41,684	1.20	49,981	41,684	1.20	49,981
	Total			\$6,493,223			\$6,596,638			\$6,769,983			\$7,566,192			\$8,312,146
	Manhattan Bridge Bids for Anchorage Steel, Towers, Cables and Suspended Superstructure, Received May 7, 1906.															

character in manufacture and erection as to require the close attention of the most expert bridge contractors. It seems, therefore, singular that the two lower bids, within 2 per cent. of each other, should be made by firms well known as granite and masonry contractors, but never before appearing as contractors for steel bridge construction. It is plain that both Peirce and Ryan-Parker, having no steel works or plant or organization for erecting, are middle-

men, bidding for a commission on the money to be paid to the actual constructors of the bridge.

The lowest bid, by Ryan-Parker, is unbalanced, the price quoted for over 5,000,000 lbs. of simple steel work for the anchorages, merely delivered at the site, is nearly twice as great as that of the other bidders for the same work, and 60 per cent. greater than their own price for more costly material to be erected in the main span over the river. This may be partly accounted for by the desire of this bidder to get ahead in cash at the start. This material must be delivered first, within six months, and even if purchased from and delivered by one of the higher bidders would put the contractor in possession of nearly \$200,000 profit before the serious part of the work was begun.

The other low bidder, Peirce, adds one-half a cent a pound to his price of material delivered at the bridge site to cover the cost of erection of materials more expensive to make and more costly to erect in the suspended structure over the river. The three higher bidders add from 1.67 cents to 3.1 cents as cost for this work. This bidder quotes a price for the wire cable work 23 per cent. below the next higher bidder and 25 per cent. below the average of the three higher bidders for the contract. This difference is too great to be reasonably accounted for, unless by the use of inferior material.

It would be interesting to know just how much the bids were reduced by substituting the less costly basic steel for acid steel, but this cannot be precisely developed. The Pennsylvania Steel Company makes both basic and acid steel and probably has more accurate knowledge than others of the relative cost of the two materials. Judging from its bids, closely confirmed by the bids of Milliken Brothers, it would appear that the reduction due to the substitution of basic steel is about ten dollars a ton, but the John Peirce Company bids 23 per cent. less for ten thousand five hundred tons of basic steel in the suspended structure at the second letting than it did for the same amount of acid steel at the first letting and reduced its first bid for the cables, which must be made of acid steel and are not therefore affected by the change, nearly one hundred and thirty thousand dollars.

Acid steel was used exclusively in the Williamsburg bridge and cost about one hundred and fifty dollars a ton erected in place. The price for rolled material is now about ten dollars a ton more than then, so that, other things being equal, the basic steel for the Manhattan bridge should not cost more than the acid steel for the Williamsburg bridge. Other things are not, however, equal. All of the expensive cable erection must now be done by bridge men at about five dollars a day, whereas much of this work was done by common laborers on the Williamsburg bridge at about half the wages paid the bridge men. The labor cost of erection of all structural material has increased greatly in New York City since 1900, and its control is far more uncertain. This may be taken to account in great measure for the relative high prices quoted by the American Bridge Co. and Milliken Brothers, who have had recent bitter experience with the labor union. Still, we find that the bid of the General Erecting Company averages about one hundred and sixty-one dollars a ton for the whole work, or about eleven dollars a ton more than the corresponding cost of all the steel work on the Williamsburg bridge, which may fairly be taken as a just measure of the increased cost due to the terrorism of the Bridgemen's Union.

MR. HILL IN CANADA.

For a long time there have been various rumors that Mr. James J. Hill was to largely extend his sphere of railroad influence northward into Canada. Not long ago, according to report, he had bought control of the Canadian Pacific, his great northern competitor, and through the large resources of that company was to build new lines in Canada and weld the whole, both north and south of the border, into a united group. On several other occasions, according to the financial reporters, Mr. Hill had bought control of the Canadian Northern, the new and expanding line in the Canadian northwest, and through it was to build up a great Canadian system. It now turns out that, as is not infrequently true of such conjectures, the underlying fact in the case, expansion of the Hill influence in Canada, is true, but the suggested means of accomplishing this result are mostly drawn from the imagination of those railroad strategists who at one time or another involve every important railroad in a far-reaching consolidation on paper.

Already, as is well-known, the Great Northern influence reaches across the Canadian border. In the southeastern corner of British Columbia, Great Northern allied lines cross the boundary at at least

seven points, the westernmost point reached being Keremeos and the easternmost, Fernie, both in British Columbia. Under the charter of the Vancouver, Victoria & Eastern, an extension from Keremeos westward to Princeton, 40 miles, is already nearing completion, and a further extension has been located through the Hope mountains and the valley of the Fraser river, the remaining 150 miles to Vancouver on the Pacific Coast. This much is made clear in the last annual report of the Great Northern.

The first public announcement in regard to more extensive plans in Canada came in a letter from Mr. Hill, written some weeks ago, to the Winnipeg (Manitoba) Board of Trade, in which he said:

"We are now undertaking to build up a new system—a transcontinental line through the Canadian northwest—which I hope will serve to further develop your city and the country from which its prosperity is drawn."

At this announcement the railroad strategists got to work again, and soon had a Hill system in Canada stretching from Vancouver to Montreal, with branch and connecting lines bringing up the total mileage of the new system to at least 3,000 miles. More recently, in an interview in New York City, Mr. Hill denied that he had any intention of building the eastern half of this line, and brought down the length of his new Canadian mileage to 1,300 miles. This week, in an interview in St. Paul, he gave fuller facts in regard to the new line. His intention is to connect Winnipeg and Vancouver with each other, and the new line at several points with the Great Northern in the United States. The Vancouver, Victoria & Eastern extension will furnish the western end of the line. The Great Northern feeders, which at present extend north into British Columbia, are mostly, more or less at right angles to the Great Northern main line, and there is no direct connection between Keremeos and Fernie, which are some 200 miles apart. This will probably shortly be built, bringing the Vancouver line as far east as Fernie. Fernie is just west of Crow's Nest Pass, where the Great Northern interests are developing great coal deposits. After crossing the Rocky Mountains at this point on what are reported to be exceptionally favorable grades—and good grades are Mr. Hill's hobby—the line turns northeast, crossing the Canadian Pacific main line probably at Medicine Hat, where large purchases of land are reported for division headquarters. The line is to run considerably north of the Canadian Pacific main line, crossing the great wheat prairies to Winnipeg. At the same time, a connecting link from the United States boundary, already reached at Emerson by a Great Northern branch, is to be built to Winnipeg, where terminals have already been acquired. More than this, at least two other connecting lines are already well under way north from the present termini of Great Northern branches in North Dakota; one from Greta, on the international boundary, northwest to Portage la Prairie, and the other from Bottineau, a few miles south of the boundary, north via the Canadian towns of Boissevain and Souris, to Brandon, Manitoba. This, as nearly as can be told from Mr. Hill's statements, is the extent of his immediate plans for new lines in Canada.

The exact location of the Fernie-Winnipeg line has not yet been made public, but Mr. Hill made the significant statement that instead of seeking the most direct transcontinental route he was most concerned in tapping a territory prolific in agricultural resources, where the local traffic was sure to be heavy. Apparently, therefore, it will swing northeast through the northern part of Assiniboia, and finally south again through the highly competitive territory in Manitoba west and northwest of Winnipeg, already well occupied by Canadian Pacific and Canadian Northern main lines and feeders, and with the main line of the Grand Trunk Pacific projected through it. Questioned about the means of sending further east, products received at Winnipeg over the new line, Mr. Hill remarked that for the present the Great Northern was willing to turn over traffic there to the existing Canadian roads east of Winnipeg; although, in case of necessity, Great Northern engineers had already planned an almost direct line from the Canadian boundary to Duluth, over a country where a 4/10 of one per cent. grade would be the maximum on a 280-mile line. Adding to this the 65 miles from the boundary to Winnipeg, the total distance by this route from Winnipeg to Duluth would be 345 miles, with low grades, over which to bring Canadian grain to the head of the Lakes for shipment.

From a through traffic standpoint the new Hill lines in Canada, even if roundabout, would have a certain degree of effectiveness. The Canadian Pacific has just completed an allied line into Spokane, which will give it a good, though longer, route than the Great Northern's between St. Paul and Spokane. Just as this line will be able, to a certain extent, to compete for St. Paul-Spokane traffic, so Mr. Hill's new line, though more roundabout than the Canadian Pacific's, will be able, in case of necessity, to give the Canadian

Pacific a rub for its Winnipeg-Pacific Coast traffic. More than this, when the time comes for carrying grain from Canada into the United States, it will have an added advantage over all the Canadian systems, as the Great Northern controls, with the exception of the Canadian Pacific's Minneapolis, St. Paul & Sault Ste. Marie, all of the important railroad connections in the United States reaching to the border. With this control of the territory immediately south of the line, the Great Northern will be able to bring it about that grain from its own lines in Canada rather than from the territory of the Canadian roads, shall be most easily shipped into the United States.

The main reason for the determination of the Great Northern's master to seriously invade Canadian territory is evidently the desire to share in the great and increasingly tremendous prosperity of the Canadian Northwest, and particularly in its rich local traffic, most of which is long distance at the same time that it is local. The American invasion of the wheat lands of Manitoba, Assiniboia, Saskatchewan and Alberta goes on at a rapid pace. In the past few years more and more farmers in the United States have sold their farms at high prices and moved across the border to the cheaper and (now) more fertile territory of the northwestern Canada provinces, where soil and climate have been thoroughly proved to be admirably fitted for successful wheat raising. Production of wheat in the Canadian Northwest increases by leaps and bounds each year, and according to Mr. Hill's view, the time is not as much as ten years distant when the United States will be Canada's best wheat customer. Back of the present and very rapidly growing prosperity of the region, in Mr. Hill's mind, this further economic development evidently had a very strong influence on his decision to build up a Canadian system. Should conditions, as he suggests, come to the point where it may tax the capacity of Canada to supply the needs of the United States in grain, the Great Northern, with its monopoly of the northern half of the northern tier of states west of Lake Superior, and its fifteen or more laterals reaching north from its main lines in the United States toward or across the boundary would, as already explained, be in an especially favorable position to handle this international interchange of traffic.

Once established in Canada, if the precedents of the Canadian Pacific and Canadian Northern count for anything, and particularly if Mr. Hill's own policy in the United States is an example, there will be constant expansion of his influence. If the Canadian Pacific finds it profitable to build several hundred miles of branches and connections in the Canadian Northwest every year, the Great Northern can hardly fail to find it equally profitable. The region is so vast that not nearly all of the desirable situations are already occupied. A map of western Canada, showing the northern limit of cereal growing territory is especially suggestive of the immense possibilities of expansion. The productive area takes in a wide sweep of territory, including all of the province of Manitoba, the districts of Assiniboia, Saskatchewan and Alberta, more than two-thirds of the great district of Athabasca, part of the province of Mackenzie, a scrap of Yukon territory, and the northeastern corner of British Columbia—a vast region. With the greater demand for cereals and further development of agricultural methods by which grain raising may be more successfully carried on in these higher latitudes, it is not at all improbable that Great Northern lines will eventually penetrate to some of these now far north regions. Putting aside all the rumors of Hill lines to be built at once as far north as Edmonton and Prince Albert, a suggestive fact in this connection is the recent granting of permission to the Vancouver, Westminster & Yukon, a small road near Vancouver, more or less affiliated with the Hill system, to build lines from Vancouver northward to the Alaska boundary, with a branch northeast to Edmonton.

It is somewhat puzzling at first to see why Mr. Hill waited so long to build his Canadian line. The principal reason probably is that even his marvelous foresight never expected such growth as has taken place in the past ten years in northwestern Canada. A second reason no doubt is that up to this time he has been kept busy in strengthening and assuring his territorial control in the United States. With the northwestern strip now held fast, he naturally looks for new fields to conquer. A third reason is that the Great Northern, a United States road, could never hope to obtain the great subsidies which helped the Canadian roads to break into and open to civilization these great areas of productive territory. By having waited for the pioneer roads to develop the region, so that traffic will at once be offered to a new line, Mr. Hill is able to build his Canadian railroad without subsidy, an argument which will be practically unanswerable as against the objection which is

already being shown in eastern Canada to what is called "Hill's Canadian Invasion." The first railroads have opened up the country, demonstrated its richness, advertised its resources, and brought in many thousands of colonists, and now the problem for a new railroad of getting traffic is comparatively simple. Resources, and what is more important, settlers, are there and production waits only on the railroad. It may easily be that instead of being a procrastinator, Mr. Hill has seized upon the most fortunate time for his entrance into the vast Canadian wheat field.

A contemporary announces that in its June number it is going to commence a series of articles on "railroad abuses." Its decision to do this "springs from the highest sense of duty, prompted by exhaustive investigation." We are informed that "no frenzied or hysterical crusade is to be made." No, indeed! The eminently judicial attitude of the publishers is shown by the following expressions from the advance circular, which is printed on pink paper with the caption "Break the Railroads' Throttling Grip!"

"Merciless railroad octopus."
 "Spirit of piracy savagely avaricious."
 "Trampled the laws under foot."
 "Hurled defiance into the teeth of the masses."
 "Infamous conspiracy."
 "Organized treason."
 "Callousness of a Nero."
 "Inflicting monstrous losses upon bound victims."
 "Indifference of revolutionary madness."
 "Unspeakable repulsion."
 "They have their own despicable creatures upon the bench."
 "Shamelessly vicious masters."
 "Without a parallel in the annals of commercial atrocity."
 "The railroads are the most powerful, dangerous and treacherous of the blood suckers sapping the strength of the body politic and menacing the life of the nation itself."

Upon arriving at the fourth page of the pink pamphlet, the reader is inclined to be glad that no frenzied and hysterical crusade is to be undertaken, for where could the author find words for such a crusade? And who is the calm, dignified economist who is going to link up these honeyed phrases into a series of articles, keeping his hand of steel well masked in the glove of velvet? The Honorable (!) Chas. E. Townsend, member of Congress, author of the Esch-Townsend bill.

With all the improvements in railroading, the handling of trunks remains as a relic of early crudity. It is the universal usage on American railroads, to handle personal baggage with consistent violence. There has been much talk about the regulation of baggage smashing, but the evil continues, upon the easy assumption that it is impossible of remedy. It remains for the transportation companies adequately to meet the situation which the tremendous growth in railroad travel has created, as they have met and solved other problems.

What is this "problem" that the *Syracuse Post* and the *Springfield Republican* are trying to inflate? There are more trunks, since the tremendous growth in travel, but does any individual trunk get treated worse than it would have been treated 40 or 60 years ago? Or do a larger percentage of the trunks get smashed? Why not consider for a moment the other side of the question—whether it is not better either to make stronger trunks or to pay the losses on trunks of the style now used, rather than try a remedy that would be more costly than the disease. Either the baggage handlers must take more time, delaying the trains, or facilities must be provided at all stations to lift and lower trunks by gentle movements. Delays annoy the passenger, and increased facilities must in the end be paid for by him. Practically all of the smashing that passengers or editors complain of is that due to dropping inflexible-frame trunks on their corners on hard floors. Sole leather trunks, having no rigid frames, are immune to this danger. Would it not be cheaper to buy sole leather trunks? Some of the "problems" evolved by space writers are wholly imaginary. Why not bring up the problem of the breakage of tea cups and tumblers in the kitchen? As dish-washing is now a department of railroading (in dining cars) the subject is "affected with a public interest" and would be suitable not only for dull-season editorials, but for agitating the sleepy atmosphere of the halls of legislation. Flexible crockery and unbreakable drinking glasses are a crying need.

Delaware, Lackawanna & Western.

The Delaware, Lackawanna & Western is one of the richest anthracite coal roads, and is also a New York-Buffalo trunk line. Its charter antedates the provision of the Pennsylvania state constitution prohibiting railroad companies from engaging directly in the coal-mining business, and therefore its report is a combination of results of operation of a trunk-line railroad and a coal-mining company, the tonnage of anthracite coal being, however, greater than the total tonnage of all other commodities transported by the railroad. In this double capacity, as in the case of most of the

anthracite coal roads, it is pretty clear that the company receives more for coal transportation than it would were not the business held so closely in control by the anthracite community of interest. At any rate, the average ton-mile rate last year was 0.871 cents per ton on coal, against 0.688 cents per ton on merchandise traffic; whereas, on most roads the rate received on coal is much lower than the average rate on merchandise. More than this, even with over \$2,000,000 charged to operating expenses for extraordinary improvements, the operating ratio was only 53 per cent.

The Lackawanna has in recent years been exceptionally prosperous. In 1904 a regular dividend of 7 per cent. and an extra dividend of 10 per cent. were paid, and last year the regular rate was raised to 10 per cent. and another 10 per cent. "Christmas present" made at the end of the year to stockholders. As a consequence of this prosperity, the stock sold in October last within two points of 500. The road earned last year over charges, as shown in its income account, 30.29 per cent. on its capital stock. The real earnings on the stock have been estimated as high as 50 per cent.

Earnings from transportation of coal in 1905 touched the highest figure in the company's history—\$13,993,585—surpassing the previous high record of \$13,826,844 reached in the rush of business immediately succeeding the 1902 strike. Besides this account, transportation earnings are divided into earnings from miscellaneous freight (other than coal), passengers, mail, express, milk, by ferries, and from miscellaneous sources. Every source of earnings shows an increase for the year, the gains ranging from 5.76 per cent. on coal to 14.48 per cent. from miscellaneous sources. Miscellaneous freight earnings were \$9,230,787, an increase of \$892,965, or 10.71 per cent. Passenger earnings were over \$5,500,000, an increase of

maintenance of way expenditures included in the betterment account, the total figure for maintaining way and structures would be still further increased. These amounts are clearly very large. What was done with these large funds is told in considerable detail, which pleasantly contrasts with the practice of some roads in giving only brief general statements of such expenditures.

The Lackawanna's balance sheet shows a wonderfully strong financial position. There is \$26,200,000 capital stock outstanding, and there are also \$3,067,000 bonds (maturing next year). These constitute the entire capitalization, and are almost covered by the profit and loss surplus of \$23,800,000. The Delaware, Lackawanna & Western proper owns 139 miles of line. The other 818 miles are mostly leased by paying dividends and interest on the securities of the leased companies. Counting in the \$90,000,000 stocks and bonds of these leased companies, the total capitalization would, of course, be greatly increased. The annual charges on these securities amount to \$5,155,800, but receipts from operation of these lines must easily cover the charges, so that the financial condition of the parent company, as shown by its assets and liabilities is a remarkable one.

Maintenance of equipment is the only operating expense which decreased in 1905. This decrease was wholly in the item of repairs and renewals of freight cars, and was due to the large expenditures in previous years for repairs of the freight equipment. Most of the older cars have now either been torn down and scrapped or put in thoroughly serviceable condition, so that this particular expenditure was last year lessened by \$129,703, or about 10 per cent. Repairs of locomotives cost \$1,533 per locomotive, against \$1,554 in 1904; of passenger cars, \$539 per car, against \$544 in 1904, and of freight cars, \$48 per car, against \$53 in 1904.

These rather low figures are over-balanced by very large expenditures out of income on renewal and betterment account for new rolling equipment, which amounted for the year to more than \$1,750,000. Maintenance of way, as already mentioned, cost \$4,849 per mile. This is against \$4,092 per mile in 1904. Conducting transportation shows an apparent increase of \$1,368,000, \$978,000 of which was due to charging for the first time expense of ferries to that account. Offsetting this new charge, gross earnings from ferry operations were \$1,094,000. Both of these figures must be considered in making comparisons of total net earnings and expenses for the year, the company having last year for the first time itself operated its North river ferries, formerly owned by the Hoboken Ferry Company.

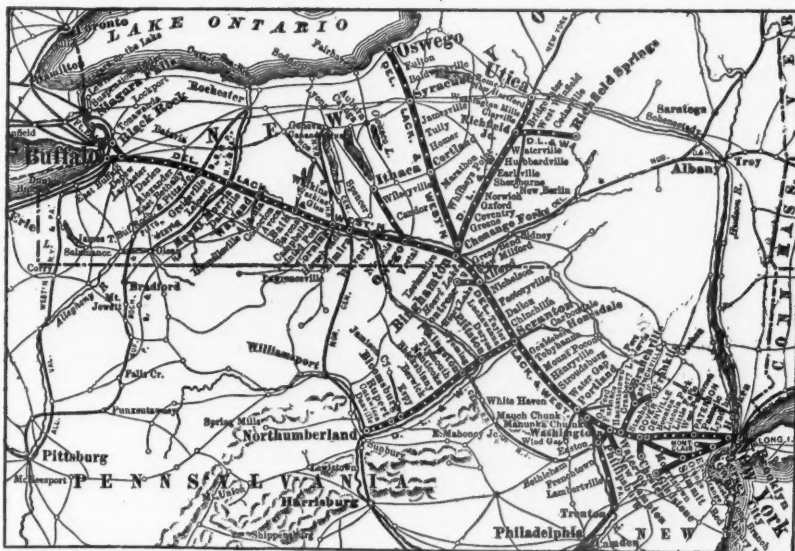
The reconstruction of the road has made large returns in increased efficiency of operation. In the last six years there has been an increase of over 1,000,000,000, or about 55 per cent., in the revenue ton mileage, against an increase of only 679,000, or about 11 per cent. in the freight train mileage. The revenue train load at the same time has increased from 325 tons in 1900 to 461 tons in 1905. Evidently the good effect of the money spent on improvements can here be very directly traced.

The gross tonnage of anthracite coal was 9,168,974, an increase of 553,176 tons over 1904. All other tonnage (net tons) was 8,166,768, an increase of 870,086 tons. Of the general tonnage figures, grain furnished 522,935 tons, a decrease of 342,900 tons; bituminous coal, 940,100 tons, an increase of 66,541 tons; lumber, 317,591 tons, a decrease of 127,890 tons; and merchandise (distinct from manufactures), 1,226,275 tons, an increase of 491,634 tons. The latter figure is an especially satisfactory item of increase in high-class traffic.

The coal department makes a separate report of its operation, which shows that it earned \$41,226,647 in 1905, as compared with \$38,593,598 in 1904. Both figures include coal on hand December 31, which amounted to 655,924 tons last year as against 955,400 tons in 1904. The profit from the coal department's operations transferred to the general account are \$3,295,426, less by \$150,000 than in 1904. Since there was a largely increased output, and a better average price received for coal, this shows how liberally betterments to the coal properties have been charged against earnings of the coal department.

During the year the Lackawanna bought the Harlem Transportation Company, which controls a freight terminal on the Harlem river in New York City. Since the close of the year it has made a large purchase of land in Brooklyn for a Brooklyn freight terminal. These purchases are an evidence of the increasingly important position of the road among the Eastern trunk lines. Its success in securing fast freight traffic is another proof of the same fact.

The extensive grade crossing work at Newark has been completed, having been accomplished along with the running of a large suburban passenger service over tracks located on the grounds where



Delaware, Lackawanna & Western.

6 per cent. These two sources of earnings are, in the case of a great coal road like the Lackawanna, always interesting as showing what would be left to the road if it were deprived of its coal traffic. It has been the particular effort of the present management, which took control on March 1, 1899, to increase these general earnings. In 1899 miscellaneous freight earnings were \$6,300,000. As already mentioned, they have now risen to over \$9,200,000. Passenger earnings in 1899 were \$3,950,000. They were \$5,530,000 in 1905. These two figures reflect in a fair way the increased general prosperity of the road.

Along with and even more important than this effort of the present officers has been the practical reconstruction of the whole line. This has been accomplished steadily, effectively and to a strikingly large extent. As an instance, automatic block signals of the most modern type have, during recent years, been installed; the work progressing west year by year, until now it is expected that by the end of the present year the entire line between Hoboken and Buffalo will be fully protected. This is only a small instance of the thoroughness of the improvement policy. An idea of its extent can perhaps best be gained from the fact that with only 957 miles of operated line, of which only 410 miles is main track, the company last year, following the great improvement expenditures of the years immediately preceding, charged to the year's income renewals and betterments costing over \$3,500,000. This was in addition to \$2,280,000 included in operating expenses, representing extraordinary expenditures, mostly for maintenance of way. In addition, the regular expenses on the line brought up maintenance of way cost to \$4,849 per mile. Of this sum, ordinary expenditures cost \$2,479, and extraordinary expenditures, \$2,370 per mile. Adding in

the work was being done. Similar work at Summit has also been finished. No progress appears to have been made during the year in coming to a satisfactory agreement with several other municipalities in the suburban district of New Jersey, and further work of this kind is put off until such agreements can be made. The past year saw the completion of and putting in service of the new ferry terminal at the foot of Twenty-second street, New York City, and its almost total destruction by fire on December 20, after having been in operation less than three months. Earlier in the year, on August 8, the Lackawanna's passenger and ferry terminals at Hoboken were destroyed by fire. This was not altogether a misfortune, as the property was well insured and the burnt buildings would have had to be torn down within a year or two to make way for new terminal buildings. Consequently, the delay and inconvenience caused were the most serious features of the loss. As observed by those who use the road's suburban service, order was brought out of the confusion with great energy and skill. The new terminal is, in large part, to be completed during the present year.

With the settlement of difficulties in the anthracite mining industry for the next three years, the present high prosperity of the Delaware, Lackawanna & Western is likely to continue for at least that length of time. Its ownership of some 400,000,000 tons of unmined anthracite is tremendously valuable, and year by year, as a result of the large expenditures on improvements, its property becomes more and more efficient and its traffic consequently more and more profitable.

The principal statistics of operation follow:

	1905.	1904.
Mileage worked	957	957
Coal transportatn earnings	\$13,993,585	\$13,230,871
Freight earnings	9,230,788	8,337,823
Passenger earnings	5,529,002	5,215,919
Gross earnings	31,951,064	28,701,991
Maint. way and structures	4,640,208	3,916,117
Maint. of equipment	2,871,911	2,937,675
Conducting transportation	9,816,196	8,448,362
Operating expenses	17,827,975	15,758,893
Net earnings	14,123,089	12,943,098
Coal department earnings	3,295,426	3,445,477
Gross income	17,061,967	16,191,419
Net income	7,938,429	6,773,871
Surplus	2,698,429	2,319,871

TRADE CATALOGUES.

Pacific Type Passenger Locomotives.—A pamphlet just issued by the American Locomotive Company describes Pacific type passenger locomotives built for various railroads. The pamphlet opens with a description of the Pacific type and an outline of the special advantages for very heavy and fast passenger service. These are very briefly stated and are followed by a description of two forms of trailing trucks which have been used with great success on this type of locomotive. The description is followed by two pages of tables containing, in condensed form, the leading dimensions of all the locomotives illustrated in the pamphlet, the tables being arranged in the order of the total weight of the locomotives. By use of the side elevation and sectional drawings a typical Pacific type locomotive is illustrated and engravings of outside and inside bearing trailing trucks are included. The remainder of the pamphlet is devoted to photographic reproductions of locomotives, the opposite pages containing tabular information concerning each design. This is the first of a series of catalogue pamphlets to be issued by the company, which will eventually include all the standard types of locomotives, and will constitute a record of locomotive production.

Wisconsin Central Summer Book.—The 1906 "Summer Book" of the Wisconsin Central tells of the summer resorts in Illinois and Wisconsin reached by this road. The book is 5 x 7½ in order to have it a convenient size for handling, and, as explained in the introductory note, its purpose is only to give hints of the characteristic features of the various localities. It is filled with attractive half-tone engravings, enumerates briefly the interesting points of each resort, and gives hotel lists and rates. It contains 80 pages.

CONTRIBUTIONS

Color Blindness and Scripture.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have read with interest the note in your issue of May 11, page 484, stating that the Prussian state railroads have adopted a new method of testing employees for color blindness, the implication being that the Holmgren method has not proved itself to be entirely satisfactory; and stating also that the examiners must have their own eyes tested and shown to be perfect. Whether or not

the worsted method, so long used both in Europe and this country, has actually failed to detect defective eyes in every case would be an interesting question, as well as the question what has been done to improve on the Holmgren method. Possibly our German friends have simply adopted Drs. Williams' and Scripture's scheme of using a light to test for that defect of the eye, caused by the use of tobacco, which becomes manifest only when the subject is required to observe a small signal, as a red light, which is at a long distance away and makes an image only on the center of the retina. However, I do not write you to present this point particularly, but rather to congratulate you on the poetic vein in which your editor writes. His reference to the blind leading the blind into the ditch gives a literary touch which one encounters all too rarely in our technical journals. Would that more of our writers had minds steeped in the classical thought and terminology of the King James Bible. But this literary charm is only a charm, after all. The allusion satisfies one's taste for pleasant reading, but it is not worth a cent in the actual business in hand. An examiner of eyes is not dependent on good eyes. His defect need not harm either the color blind examiner or the railroad. With the use of the numbered test colors a person having no sense of color whatever can test a man's eyes successfully, as has been shown over and over again. Indeed, if the numbers on the sticks, or glasses, or skeins of yarn were raised so that they could be read by touch, a person who is stone blind could satisfactorily manage the test of another man's eyes. The subject tests himself; the examiner merely testifies to the result.

It is perhaps to be expected that blind railroad commissioners will lead blind legislators into the ditch of useless and silly laws, because that is the way to please the wilfully blind locomotive engineers—who object to having their eyes tested for color blindness as persistently as conductors object to having their fingers tested for honesty; but spare us, please, the spectacle of an editor whose acuteness of vision for scripture makes him blind to the facts of science. Anyone who wants scripture in this connection should rather turn his attention to Yale university—to the late chief of the psychological laboratory there, Dr. E. W. Scripture, who has in years past instructed the readers of the *Railroad Gazette* on the subject of color blindness.

J. B. B.

Canada as Seen by J. J. Hill.

James J. Hill has given out an interview concerning his plans for a new transcontinental Canadian road to parallel the Canadian Pacific and Canadian Northern, in the course of which he says:

"The Canadian subsidy policy is entirely unnecessary. With the country developed as it is, railroads should be built without costing the people a cent. That is the policy we have followed in our country, and that it has paid handsomely I can easily prove. We propose to build our Canadian system at the lowest possible cost consistent with excellent work and thorough equipment, for, as you must have gleaned from the tenor of my policy, I am a believer in the best roadbed, the lowest grades, the biggest engines and the largest capacity in rolling stock. Only a cheap and faulty road could be produced for \$9,000 a mile. Such a road as we intend to build will cost between \$18,000 and \$20,000 a mile.

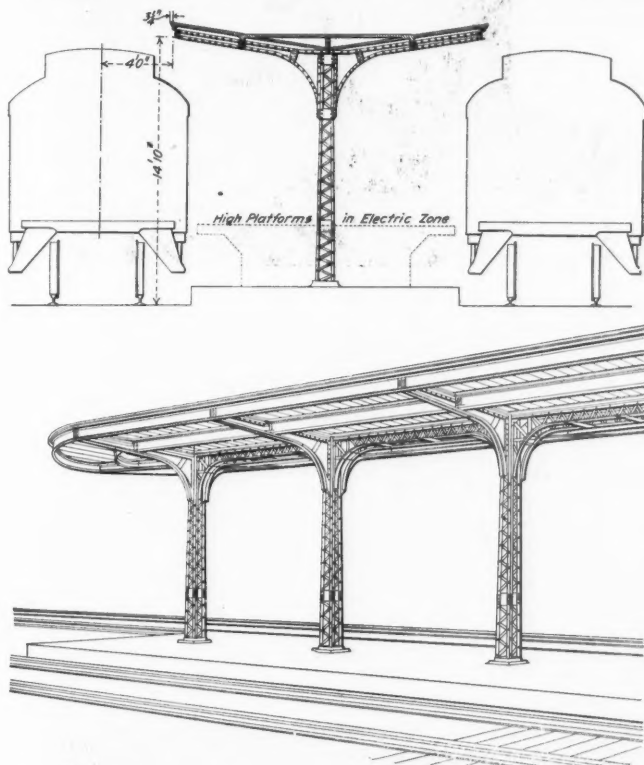
"In Canada we do not propose to bond our roads for a dollar. We shall issue stock representing the actual cash outlay, and as we have never figured on receiving more than an average of 7 per cent. on our outlay, you will see that the burden upon the people will be light. Our policy will enable us to set a new pace in the matter of rates, and I think you can mark it down that as a result of our advent into this splendid territory an effective period will be put to the bonusing or subsidy system. I should scarcely think that public men would care to propose subsidies and that companies would have the hardihood to ask them in face of the facts.

"Something is going to happen in a very few years that will change the entire trend of Canadian trade and give such a market for Canadian surplus product of foodstuffs as is little dreamed of. Just look at the United States. She has a gross product of wheat of 650,000,000 bushels, and I am sorry to say that it takes on an average two acres and a half now to produce as much wheat as one acre used to produce in the early days. Our farmers are not as wise nor as good a class as the Canadians. Canadian farmers husband their soil; ours take every ounce they can get out of it, with the result just stated. By 1910 I have no doubt that the population of the United States will have risen to 100,000,000. The natural increase is three or four millions a year, and our immigration runs nearly two millions, so you can reckon it up for yourself. Our average consumption of breadstuffs per capita is six and a half bushels, and with a production of 650,000,000 bushels of wheat, which may decrease instead of increase, you will see where we will be at in a very few more years. Then will come the chance of the Canadian West. We shall be obliged to become Canada's best customer, and the order to fill our wants will increase every year at

an astonishing rate. At first we may only want a share of the surplus, but later on it may tax Canada's capacity to supply the needs of this republic. The tariff should have been adjusted long before this, and the adjustment ought certainly not to be much longer delayed. The responsibility for it all rests with the statesmen this side of the line. Canada's greatest and best customer for her surplus products will soon be the United States."

Speaking of the Georgian Bay route—that is, the plan to use Georgian Bay, the Ottawa river and the St. Lawrence for a great waterway from the Gulf of St. Lawrence clear up to Fort William, Port Arthur, Duluth and other points on the upper lakes—Mr. Hill said:

"Nature did about all she could for Canada when she pierced the continent with the St. Lawrence, the Ottawa and the lakes, and to utilize the great boon the country must do her share. If she did, there would soon be a continuous waterway of, say, 24 ft. from Quebec or Montreal clear up to the head of Lake Superior. Just think what it would mean to Canada if that great enterprise were consummated. She could send all her wheat from the head of Superior to Quebec for 3 cents a bushel. With a 6 or 7 cent rate from the prairies to the lakes, the cost of transporting Canadian grain to Liverpool and other British ports could be reduced to the minimum. I can think of no enterprise that would so advance



Butterfly Canopy for Platform With Tracks for Passenger Traffic Only.

the interests of the Dominion. The cost, roughly speaking, would not exceed \$50,000,000, and the work might be completed in five years. But the cost is trifling compared with the advantages of such a cheap waterway. I would undertake to use the Gulf of Mexico as a more desirable outlet for Canadian products than the present one. The Gulf route is all down hill, and with the right kind of grades Canadian products could be sent to British and other markets at a very low cost; but, as I said before, the best highway is via the Georgian Bay route. There are certain disadvantages connected with the Hudson Bay route that must appeal to any man of prudence or forethought who considers the subject for himself. I have some of the reports of the Hudson Bay Company extending away back 150 years. They are not very promising, and I understand none of the Hudson Bay navigation records are."

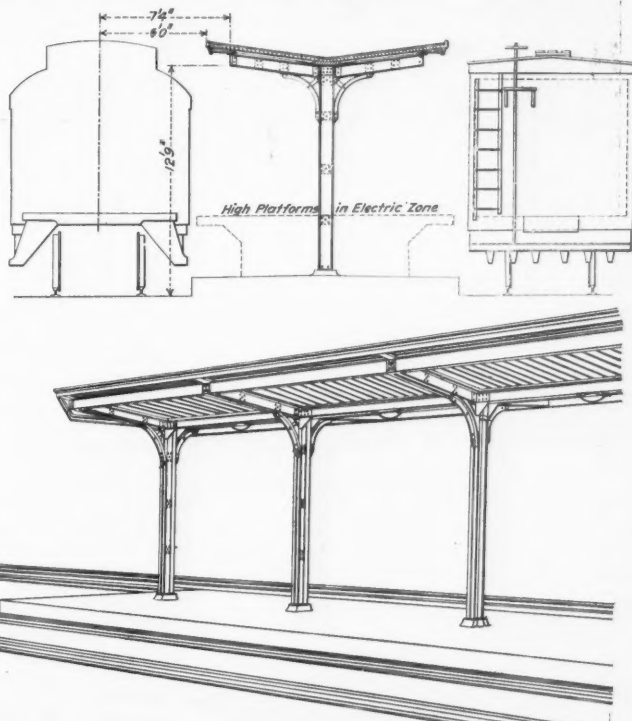
Mr. Hill also said that if all the lands still remaining in the United States that could be utilized by irrigation were so utilized, there were only 50,000,000 acres that could be reclaimed.

"I have often wondered," said Mr. Hill, "about the resources of that territory that the Grand Trunk is going to tap between Winnipeg and the East. I am told that there are unlimited deposits of peat. Now, if, as I understand, there are unlimited deposits of peat up in that country, it can be converted into charcoal at a cost of \$2.50 per ton. With charcoal you can smelt iron, which is there, and you know what that means."

Station Platform Canopies on the New York Central.

The accompanying drawings show two designs of station platform canopies which will be used on all outlying stations in the New York Central electric zone. They are both of the inverted type, supported by a single row of posts down the center of the platform and drainage is toward a single gutter over the posts, the water being carried off through down spouts inside the posts. One design is for platforms flanked by tracks used exclusively for passenger trains. It extends out to within 4 ft. of the center line of track and has an under clearance at eaves of 14 ft. 10 in. As will be seen from the outline of a standard passenger coach, the canopy affords almost complete protection when a train is standing at the station. In this design the posts are made up of four light angles, latticed, and decreasing in size at the top. The ridge pole is a similar latticed box girder, the roof carlines are light plate girders and the purlins are I-beams, with channels at the eaves. This construction gives a graceful and pleasing appearance to the finished structure.

The other design shown is for station platforms flanked by tracks used for both freight and passenger traffic. The eaves are 6 ft. from the center of the track so as not to strike men riding on box cars. A somewhat simpler construction is used, two channels placed back to back, forming the posts and two Z-bars the ridge pole. No purlins are employed, the roof boards being nailed



Butterfly Canopy for Platform With Tracks for Passenger and Freight Traffic.

to nailing strips secured to the tops of the Z-bars and the channel eaves, which are riveted to the ends of the I-beam carlines. Both types of canopies will have composition roofing laid on the roof boards and deck lamps will be put in at frequent intervals under the ridge pole.

Regarding the name "butterfly canopy" which has been adopted by the railroad company an officer writes: "The term 'butterfly canopy' is expressive of the inverted type of umbrella sheds. In other words, the term 'umbrella sheds' applies to all classes of canopies supported by a single row of posts; and this class is in turn sub-divided into two types, one of ordinary 'A' construction and the other with an inverted covering which appears to be well named 'butterfly.'"

The advantages claimed for the butterfly canopy are: (1) Better opportunities for drainage and avoidance of drip from the eaves. (2) Better appearance. (3) Better protection for passengers, especially where tracks are operated exclusively with passenger equipment, for the reason that the outer edges of the canopies project over the car far enough to shield the platforms from storms.

Canadian Railroad Notes.

OTTAWA, May 14.—In the third reading of the statute law amendment act in the Ontario Legislative Assembly extensions of time

to railroads were announced as follows: Central Ontario to Dec. 31, 1908; Brucebridge & Broding Lake to Dec. 31, 1906; Bruce Mines & Algoma to June 30, 1909, and Manitoba & North Shore, two years from Dec. 1, 1907. In the act respecting the securities for the "Soo" guarantee the date was changed from 1906 to 1907.

The Grand Trunk Pacific surveyors are all working in the Yellow Head this spring. The Pine and the Wapati passes through the Rockies have been abandoned, and attention is being given to the Yellowhead as the gateway through the mountains. The evident intention at the present time is to build up the Athabaska to the Miette, up the Miette to the Continental Divide, over the Yellowhead Pass to Moose Lake, which is the headwaters of the Fraser

with a width of 1 ft. 4 in. The cross-section at this point shows a through girder design with the floor slab formed integral with the girders. The floor is 14 in. thick at the center and 12 in. at the side, giving a 2 in. side drop for drainage. The width between girders is 16 ft. The remaining spans of the bridge are of different lengths, those on the right hand of the center span in the drawings being 16 ft. and 15 ft. respectively, and those on the left 14 ft. each. The floor slabs have a uniform thickness of 12 in. except at the side, where the thickness is increased to 16 in. for a width of 18 in. to form a low parapet.

The Heerens bridge is a deck girder design throughout, with a central girder of the same depth below the floor slabs as the side



Reinforced Concrete Highway Bridge Over Tracks of the Big Four near Binney, Ill.

river; follow the Fraser to Fort George, then up the Nechace to Fraser Lake and its tributaries, and across the second divide to the headwaters of the Bulyley, by following which they reach the Skeena at Hazelton, and thence to the terminus at Kaien Island. The advantages of this route are apparent when compared with other lines across the Rockies to the coast.

Reinforced Concrete Highway Bridges on the Big Four.

The two interesting designs of highway bridges illustrated herewith are on the Hillsboro-Mitchell short line of the St. Louis division of the Cleveland, Cincinnati, Chicago & St. Louis. The construction of this line under the name of the Chicago, Indianapolis & St. Louis Railway was described in detail and several of its bridges illustrated

girders. For the center span the side girders have a total depth of 3 ft., with a distance from bottom of floor slab, which is 8 in. thick, to bottom of girder of 2 ft. The center girder is 4 in. wider, however, these respective dimensions being 12 in. and 16 in. For the other spans the side girders are 2 ft. 8 in. deep with a distance below floor of 1 ft. 8 in. The width of side and center girders is the same, being 10 in. This bridge crosses the railroad at a slight skew.

The spans are supported by a transverse girder and reinforced concrete column construction, the girders being of varying depths, as indicated by the drawings. The columns for the center span are 3 ft. square at the bottom and 2 ft. x 3 ft. at the top, and for the side spans are 2 ft. 8 in. square at the bottom and 2 ft. x 2 ft. 8 in. at the top. Heavy fillets are formed at all junctures of girders,



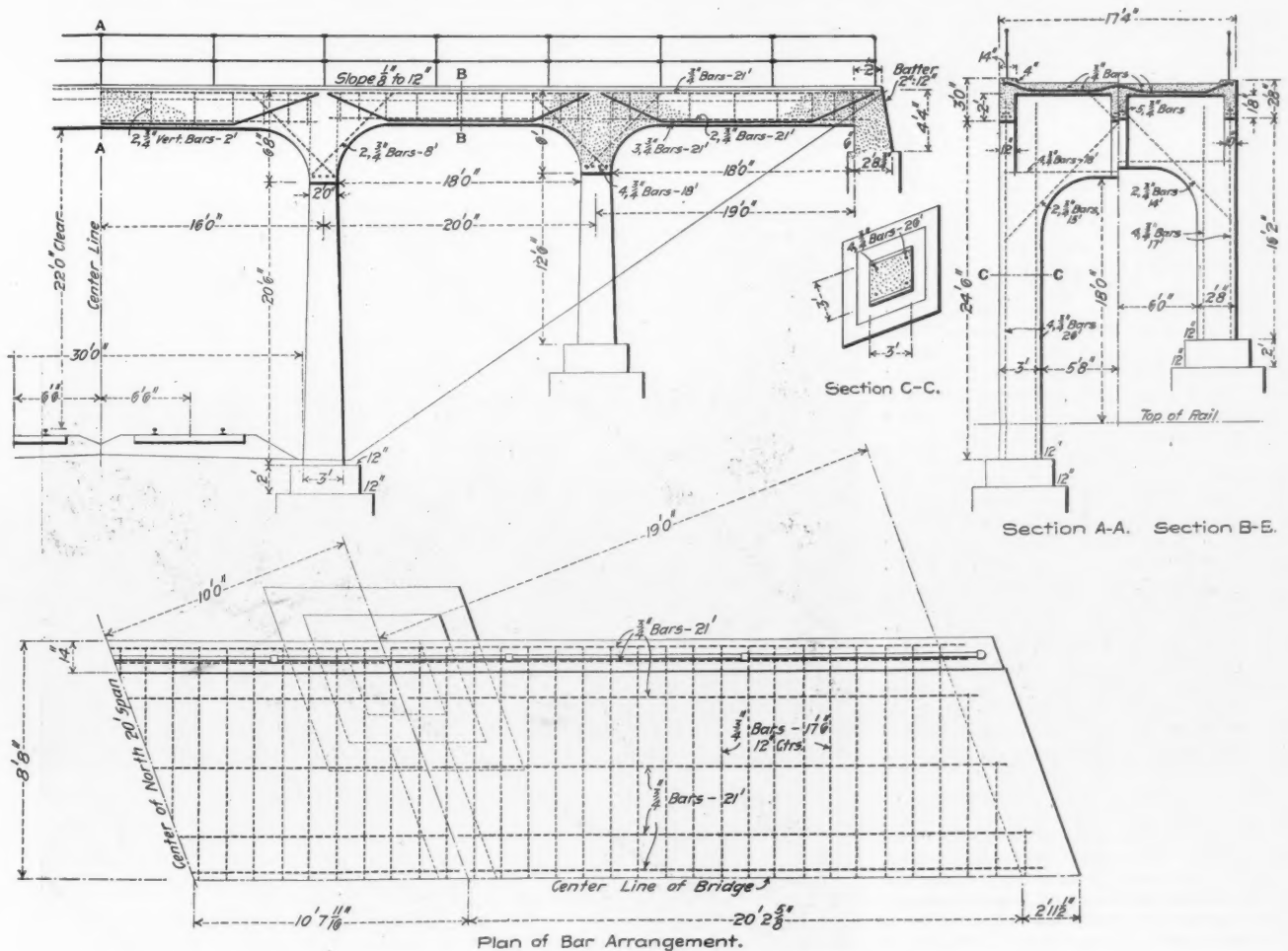
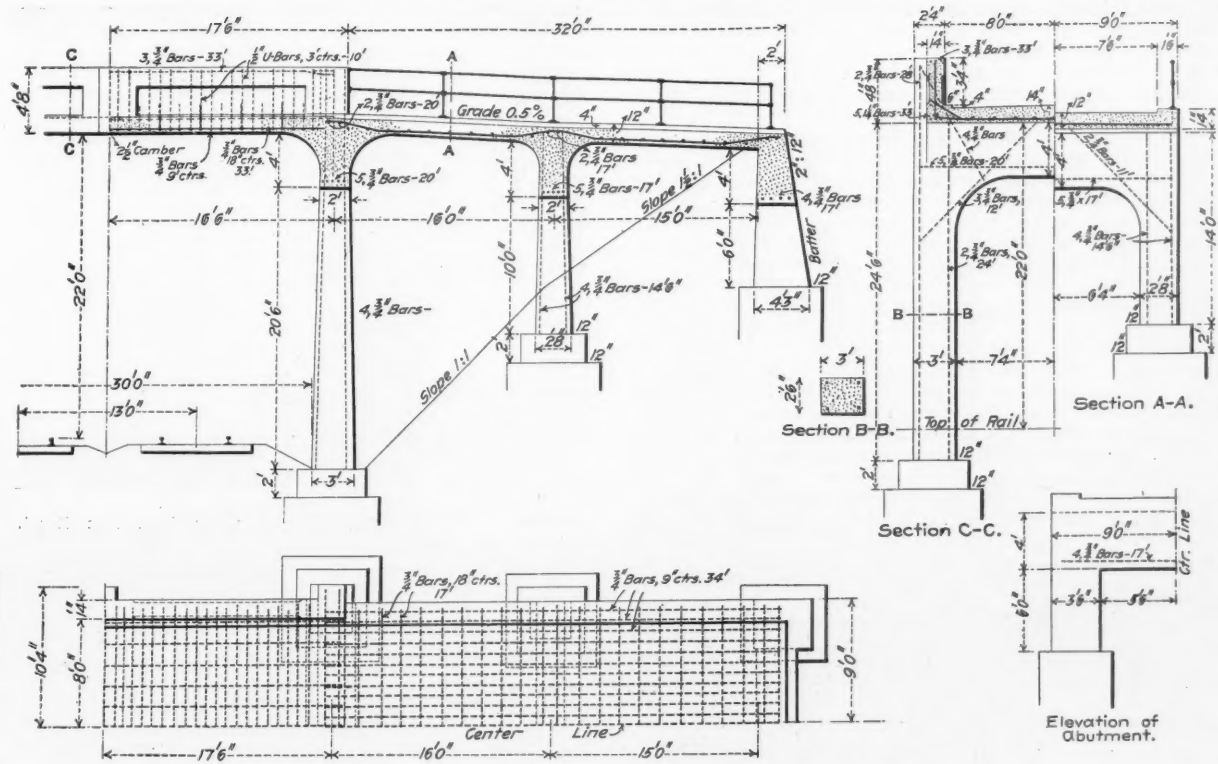
Reinforced Concrete Highway Bridge Over the Tracks of the Big Four at Heerens, Ill.

in the *Railroad Gazette*, March 11, 1904. These two bridges have been completed since that time. One is at Heerens and the other near Binney, Ill.

Both are of reinforced concrete construction. The chief feature of difference in the appearance of the two designs is the center span, which in each case is 33 ft. c. to c. of piers, spanning a double-track line. In the Binney bridge the girders of this span are much deeper than in the other, this dimension being 4 ft. 8 in.,

columns, floor slabs, etc., except at the abutments. The abutments of the Binney bridge have a 6 ft. x 11 ft. opening above foundations, but on the Heerens bridge the abutments being very low, are made solid.

The steel reinforcing by Johnson corrugated steel bars is clearly shown in detail in the drawings. The bars vary from $\frac{1}{2}$ in. to $1\frac{1}{4}$ in., there being five of the latter 33 ft. long in the bottom of each center-span girder of the Binney bridge, and three vertical

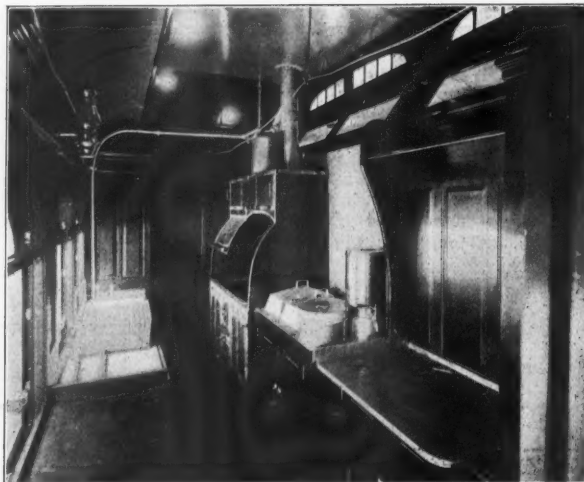


rods 8 ft. long extending from the ends of each of these girders down into the columns. Passing around the five $1\frac{1}{4}$ in. longitudinal bars in the girders are $\frac{1}{2}$ in. U-shaped bars 10 ft. long and 3 ft. on centers, the arms of which extend to the top of the girder. Also, every other floor bar extends up through the girder as shown. Other details of the reinforcing may readily be ascertained from the plans. Both bridges have 2-in. gas pipe railings.

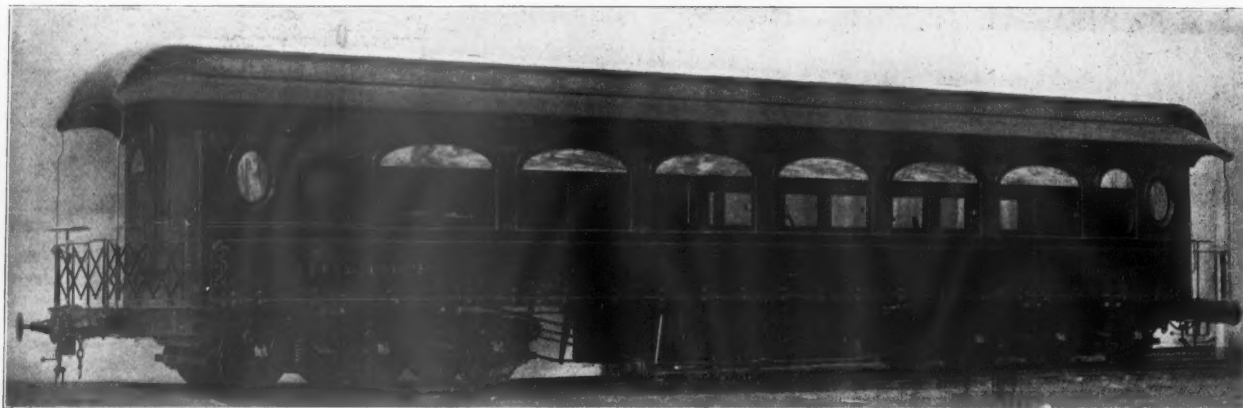
These bridges were designed and built under the supervision of Mr. W. M. Duane, Superintendent of Construction of the Big Four, to whom we are indebted for the drawings.

Dining Car for Argentine Railroad.

A handsome dining car has recently been completed at the shops of the J. G. Brill Company and shipped to the Tramway Rural, of Buenos Aires, Argentine Republic. This car is for use on a 200-mile line running southwest from Buenos Aires. The Brill Company has furnished nearly all the rolling stock of the lines of this company, including the equipment for its extensive street railway system in Buenos Aires, which has now a population of nearly one million. It ranks fourth among the shipping ports of the world and has a Spanish population of over 100,000. The Brill Company is building 85 of its semi-convertible type of cars for the city lines of the Tramway Rural. This road's equipment in gen-



Interior of Kitchen—Dining Car for Argentine Road.



Dining Car for Rural Tramway, Buenos Ayres, Argentine Republic.

eral is thoroughly modern and not surpassed by any of the large systems in this country.

The dining car recently delivered measures 50 ft. over the corner posts, 56 ft. over crown pieces, and is 8 ft. 6 in. wide over the side sheathing. It is finished in mahogany richly carved and inlaid with marquetry designs of flowers, and the alcove between each pair of windows has a fluted design which is very effective. The empire ceiling is tinted light green and ornamented with a festooned ribbon design in gold. Hand-carved grill-work transoms are at either end and the side ventilators have art glass of the same style as that which is used in the upper part of the windows. Lamp brackets of a special design which have oil burners as well as incandescent electric lamps are placed at frequent intervals in the dome. These and the double lights over each sash have frosted bulbs, and the metal is silvered and frosted. Unfortunately, it was necessary to use parcel racks which detract somewhat from the appearance, but utility had to be considered before beauty. Dark green silk draperies will be used at the windows, and together with the carpet and leather chair seats of the same color, will contrast richly with the dark red woodwork. The tables and chairs are also of mahogany, and all the woodwork is rubbed to a dull finish.

The kitchen is provided with the usual equipment of range, water-tanks, steam-table, sinks, lockers and refrigerators, all contrived to economize space to the best advantage. Push-buttons in the posts at each table are connected with a signal arrangement at the entrance to the kitchen. The entire equipment, even to the silver,



Interior of Dining Room—Dining Car for Argentine Road.

glassware, china and kitchen utensils, was furnished by the builders. Electric fans are placed in the dining compartment under the roof lining. Brass dust screens run the entire length of the car at the side of the deck ventilators. At the end of the dining compartment next to the door leading to the platform are two closets, one on each side, for linen, etc. Large provision boxes are placed under the car at each side.

The exterior of the car is painted in dark blue and ornamented in gold. To enable it to be shipped in sections, the body of the car was arranged to be divided at the center and the roof into three sections. The bottom and deck sills and long pieces upon which the main strength of the car depends were shipped whole. When set up at Buenos Aires the car will be as strong as any could be which was solidly constructed without the intention of taking apart. The trucks are made by the Brill Company and are of the six-wheel M. C. B. type, with steel-tired 33-in. wheels.

Controlled Manual Block Signals of the Chicago & Eastern Illinois.

In the article on "Chicago & Eastern Illinois Improvements" published in the *Railroad Gazette* of March 16, reference was made to the installation of the manual block signal system over certain portions of the lines. On single track these signals are electrically locked by a specially devised apparatus, preventing an operator from pulling his signal to clear until the operator at the other end of the block has unlocked it for him. The mechanism to accomplish this is illustrated herewith.

Fig. 1 is a diagram of the circuits. The apparatus at the two stations A and B is identical and a grounded circuit is used. Assume that A wishes to clear his signal for the movement of a train toward B. Having notified B by telegraph, telephone or bell code, A presses his key against front point k^1 . If B is ready to clear A's signal, B throws his key to contact with its back point k^2 . This closes the circuit from the ground, G, through B's battery B^1 and key, to the line and through A's key, and "stick" relay r, to the ground. This causes the stick relay to lift its armature and thereby close the circuit of battery B^2 through A's latch magnet m, withdrawing the latch and releasing A's lever. As soon as B presses his key, and actuates A's stick relay, he may at once release it, as magnet m and the circuit through it and r are now energized by battery B^2 . A's lever now being free to move he pulls it, and the instant he does so the circuit through the latch magnet is broken at a, permitting the latch to drop again and rest on top of the bar. The opening of the circuit at a de-energizes r so that it is also opened at rp; so that the signal cannot be cleared a second time without another restoration of the current from B, with, of course, the concurrent action of A. The action is the same in the reverse direction. The operator, after getting an "unlock," may hold it indefinitely and may delay clearing his signal until time to do it in accordance with the rule to clear it in view of an approaching train; but as long as he is unlocked he cannot give the other operator a release, for his battery is cut off at c. A circuit-breaker, CB, is placed on the signal post to be worked by the semaphore arm. If the arm is not in the stop position the circuit is broken and neither station can clear the other.

The apparatus for each block is separate and distinct, having no connection with adjoining blocks. There are two levers at each station, a northbound and a southbound, with the corresponding semaphores, and separate locking mechanisms and circuit connections as illustrated. The scheme was arranged by Mr. V. I. Smart, Signal Engineer of the Chicago & Eastern Illinois. The electric lock used is made by the Union Switch & Signal Company, and Mr. Smart has combined it with his existing manual signal apparatus in such a way that the cost of installation is not high.

The Southern Pacific's Earthquake Relief Work and Mr. Harriman's Transcontinental Run.

The splendid work done by the railroads in transporting refugees from San Francisco after the earthquake and fire disaster of April 18, the major portion free of charge, and in carrying free to the stricken city supplies of all descriptions, has been already noticed in the *Railroad Gazette*; but the real magnitude of the work is not generally appreciated without a study of the figures compiled by the Southern Pacific. In the eight days following the earthquake the rail lines of that company carried from San Francisco

proper, and from Oakland, to main line or interior points east, north and south, 115,295 passengers. Of this number, 78,560 were carried free. These figures do not include passengers carried from San Francisco by the company's ferry boats to Berkeley, Oakland and Alameda. The Southern Pacific's eastern connections also carried the destitute passengers free, and many were thus transported through the gateways at Ogden, Denver, Omaha, Kansas City and El Paso. The Chicago & North-Western and the Chicago, Milwaukee & St. Paul carried large numbers from the Missouri river to Chicago. Through the co-operation of the railroads and the citizens' committees at the principal points, and the Relief Committee at Chicago, these passengers were provided with meals and were also the recipients of many garments. Many of the free passengers were carried in special trains as far east as Chicago.

During the 18 days following the earthquake the lines of the Southern Pacific Company carried into San Francisco a total of 1,252 cars of foodstuffs, tents, blankets, coats and clothing, given by citizens of the cities and towns throughout the United States. These cars were transported free by all of the railroads which participated in their movement, and on arrival at Oakland were taken in charge by Captain J. M. Baker, Quartermaster, U. S. A. The distribution of the supplies was under the charge of C. A. Devol, Deputy Quartermaster, U. S. A.

The trip of Mr. E. H. Harriman, President of the Union and Southern Pacific roads, from San Francisco to New York, break-

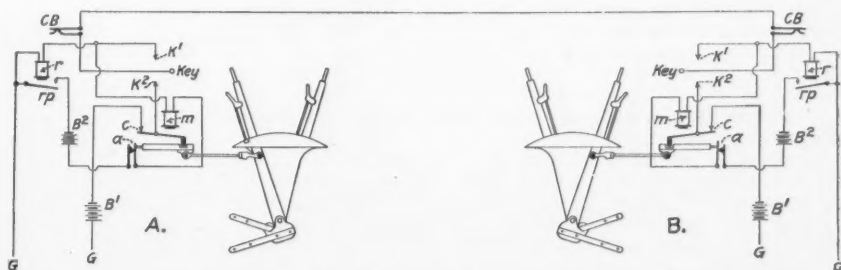


Fig. 1—Electrical Control of Manual Block Signals—Chicago & Eastern Illinois.

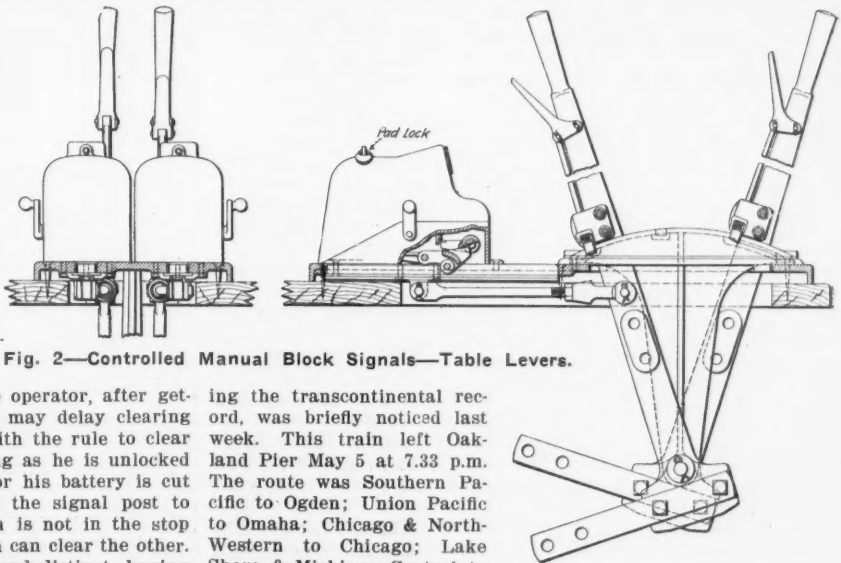


Fig. 2—Controlled Manual Block Signals—Table Levers.

ing the transcontinental record, was briefly noticed last week. This train left Oakland Pier May 5 at 7.33 p.m. The route was Southern Pacific to Ogden; Union Pacific to Omaha; Chicago & North-Western to Chicago; Lake Shore & Michigan Central to Buffalo, and New York Central to New York. The total distance was 3,255 miles, and the total time 71 hrs. 27 mins., the average speed being, therefore, 45.6 m.p.h. A condensed summary of the run follows:

Date.	Stations.	Miles.	Local			Speed, m.p.h.	Through		
			Miles.	Hour.	Time.		Miles.	Time.	Speed.
May 5.	Lv. Oakland Pier	...	...	7:33P.	...	...	...	...	...
"	Ar. Sparks	243	5:36A.	10	03	24.1	243	10 03	24.1
"	Lv. Sparks	...	6:47A.	...	11	...	...	10 14	...
"	Ar. Green River	714	10:05P.	15	18	46.7	957	25 32	37.5
"	Lv. Green River	...	10:15P.	...	10	...	...	25 42	...
"	Ar. Omaha	824	2:45P.	15	30	53.2	1781	41 12	43.2
"	Lv. Omaha	...	2:58P.	...	13	...	...	41 25	...
"	Ar. Chicago	490	12:40A.	9	42	50.5	2271	51 07	44.4
"	Lv. Chicago	8	1:25A.	...	45	...	...	2279	51 52
"	Ar. Buffalo	536	10:55A.	9	30	56.4	2815	61 22	45.9
"	Lv. Buffalo	...	1:00P.	...	05	...	...	62 27	...
"	Ar. New York	440	10:00P.	9	00	48.8	3255	71 27	45.6

The stops at the above named terminals aggregated 2 hours 24 minutes, as follows: Sparks, 11 min.; Green River, 10; Omaha, 13; Chicago (transfer), 45; Buffalo, 65. Pacific time is the standard to Sparks; Mountain time to North Platte; Central time to Buffalo, and Eastern time to New York; so that one hour is lost at Sparks; one between Sparks and Omaha, and one at Buffalo. A special train of three cars was used as far as Buffalo, and from

there the journey was made by the Empire State Express of the New York Central. The fastest running of the entire trip was made on the Union Pacific, where the stretch of 137 miles from North Platte to Grand Island, Neb., was covered at the rate of 66.8 m.p.h.; and between Cheyenne, Wyo., and Sidney, Neb., 102 miles, at 64.7 m.p.h.

Car Service Questions.*

The committee on per diem made a report embodying the decisions of the Arbitration Committee of the American Railway Association on the question, Who should pay the per diem on a car loaded to a destination which is a point common to two or more roads, no specific track delivery being stipulated, and the car on arrival at billed destination being turned over, for delivery to consignee, to a road which does not pay per diem? The committee decides that the last per diem road, the one making the delivery to the non-per diem road, is responsible.

The committee on office methods reported a code of rules for tracing interline car load freight. These in brief require all tracers to go through the car service department; not to be started until the shipment has had time to reach destination, and not to be sent by wire except in the case of perishable, or highly important, or unreasonably delayed freight. Each intermediate agent must reply direct to originating office and then forward tracer. When originating with the consignee, the tracer is to be transmitted backward until the shipment is located, and then sent forward. The committee recommends the taking of a letter ballot on the adoption of this code.

The committee on railroad service mail offered for discussion the following propositions:

1. Railroad business mail consists of correspondence of such classes as are not prohibited by the United States Postal Laws and Regulations; all classes of printed matter and such light articles as may be properly handled in the form of parcels or packages.

2. As railroad companies are not restricted in the forwarding of printed matter, packages containing such matter should be of uniform limited size and weight.

3. Pouches should be used for important local and terminal points, the number of pouches to be determined upon by the department having the oversight of handling railroad business mail; the pouches to be forwarded on stated trains and to be regularly entered on report of train baggage men.

4. (A) Preference mail which requires prompt handling should be enclosed in a special envelope of distinctive color and proper instructions issued for handling the same. Forwarding office should date the envelope containing this matter and show the number of train on which it is to be forwarded.

(B) Waybills should be enclosed in a special envelope provided for that purpose, which shall bear the imprint "Waybills." Forwarding office should date the envelope containing this matter and show the number of train on which it is to be forwarded.

5. A dating stamp should be used on waybill envelopes and other preference mail, to be fixed in the baggage room or on the baggage car.

6. Regular pouch service should be maintained for valuable letters and packages in order to reduce the number of receipts which otherwise must be signed by each employee handling separate pieces.

7. In the interests of economy and expedition in handling, railroads should adopt standard size envelopes so far as may be possible, for enclosing railroad business mail.

8. The initials R.R.B. are used most extensively. The initials R.R.S. are second in general use to initials R.R.B. The committee was favorably impressed by a suggestion that the initials R.R.M. be used, indicating railroad mail, and recommend that the Association determine by letter ballot, which of the three forms is most desirable. Marks indicating that the contents are railroad business should appear in the upper right hand corner of each envelope, and each envelope should bear the name or trade-mark of the railroad in the upper left hand corner.

9. The service could be improved by harmonizing the instructions on different roads.

A Check for Baggage on Storage.

The accompanying illustrations show the front and reverse sides of a check introduced a few months ago on the New York Central Lines, used in handling baggage on which storage charges accrue. As will be seen by examining the different parts of the check and the instructions printed on the back, one of these checks is attached to each piece of baggage on the expiration of the free limit of storage, the top stub, perforated with the round hole, at the same time being sent to the Auditor of Passenger Accounts as

a preliminary check to be accounted for after payment for storage has been made. When the check is attached to a piece of baggage the date and hour at which storage charges begin to run are entered on each of the three parts of the check. The two lower parts fold

Form G. B. O. 1-A A. G. B. A.

Grand Central Station NEW YORK

STORAGE STUB

Kind of Check

Number

Storage due on above from

.....o'clock.....M.

.....19.....

88888

A. G. B. A.

Grand Central Station NEW YORK

Storage Check

.....M.....19.....

Date Del'd	Time Del'd	Days	Amount
1 17	A. M. P. M.	1	* 25c
2 18	1	2	* 35c
3 19	2	3	* 45c
4 20	3	4	* 55c
5 21	4	5	* 65c
6 22	5	6	* 75c
7 23	6	7	* 85c
8 24	7	8	* 95c
9 25	8	9	* \$1.00
10 26	9	10	* \$1.10
11 27	10	11	* \$1.20
12 28	11	12	* \$1.30
13 29	12	1	* \$1.40
14 30		2	* \$1.50
15 31		3	* \$1.60
16		4	* \$1.70
		5	* \$1.80
		6	* \$1.90
		7	* \$2.00
		8	* \$2.10
		9	* \$2.20
		10	* \$2.30
		11	* \$2.40
		12	* \$2.50
		13	* \$2.60
		14	* \$2.70
		15	* \$2.80
		16	* \$2.90
		17	* \$3.00
		18	* \$3.10
		19	* \$3.20
		20	* \$3.30
		21	* \$3.40
		22	* \$3.50
		23	* \$3.60
		24	* \$3.70
		25	* \$3.80
		26	* \$3.90
		27	* \$4.00
		28	* \$4.10
		29	* \$4.20
		30	* \$4.30
		31	* \$4.40
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		33	* \$4.60
		34	* \$4.70
		35	* \$4.80
		36	* \$4.90
		37	* \$5.00
		38	* \$5.10
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		43	* \$5.60
		44	* \$5.70
		45	* \$5.80
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		51	* \$6.40
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		55	* \$6.80
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		65	* \$7.80
		66	* \$7.90
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		75	* \$8.80
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		82	* \$9.50
		83	* \$9.60
		84	* \$9.70
		85	* \$9.80
		86	* \$9.90
		87	* \$10.00
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		89	* \$10.20
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		96	* \$10.90
		97	* \$11.00
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		145	* \$15.80
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		153	* \$16.60
		154	* \$16.70
		155	* \$16.80
		156	* \$16.90
		157	* \$17.00
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		165	* \$17.80
		166	* \$17.90
		167	* \$18.00
		168	* \$18.10
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		177	* \$19.00
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		185	* \$19.80
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		224	* \$23.70
		225	* \$23.80
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		271	* \$28.40
		272	* \$28.50
		273	* \$28.60
		274	* \$28.70
		275	* \$28.80
		276	* \$28.90
		277	* \$29.00
		278	* \$29.10
		279	* \$29.20
		280	* \$29.30
		281	* \$29.40
		282	* \$29.50
		283	* \$29.60
		284	* \$29.70
		285	* \$29.80
		286	* \$29.90
		287	* \$30.00
		288	* \$30.10
		289	* \$30.20
		290	* \$30.30
		291	* \$30.40
		292	* \$30.50
		293	* \$30.60
		294	* \$30.70
		295	* \$30.80
		296	* \$30.90
		297	* \$31.00
		298	* \$31.10
		299	* \$31.20
		300	* \$31.30
		301	* \$31.40
		302	* \$31.50
		303	* \$31.60
		304	* \$31.70
		305	* \$31.80
		306	* \$31.90
		307	* \$32.00
		308	* \$32.10
		309	* \$32.20
		310	* \$32.30
		311	* \$32.40
		312	* \$32.50
		313	* \$32.60
		314	* \$32.70
		315	* \$32.80
		316	* \$32.90
		317	* \$33.00
		318	* \$33.10
		319	* \$33.20
		320	* \$33.30
		321	* \$33.40
		322	* \$33.50
		323	* \$33.60
		324	* \$33.70
		325	* \$33.80
		326	* \$33.90
		327	* \$34.00
		328	* \$34.10
		329	* \$34.20
		330	* \$34.30
		331	* \$34.40
		332	* \$34.50
		333	* \$34.60
		334	* \$34.70
		335	* \$34.80
		336	* \$34.90
		337	* \$35.00
		338	* \$35.10
		339	* \$35.20
		340	* \$35.30
		341	* \$35.40
		342	* \$35.50
		343	* \$35.60
		344	* \$35.70
		345	* \$35.80
		346	* \$35.90
		347	* \$36.00
		348	* \$36.10
		349	* \$36.20
		350	* \$36.30
		351	* \$36.40
		352	* \$36.50
		353	* \$36.60
		354	* \$36.70
		355	* \$36.80
		356	* \$36.90
		357	* \$37.00
		358	* \$37.10
		359	* \$37.20
		360	* \$37.30
		361	* \$37.40
		362	* \$37.50
		363	* \$37.60
		364	* \$37.70
		365	* \$37.80
		366	* \$37.90
		367	* \$38.00
		368	* \$38.10
		369	* \$38.20
		370	* \$38.30
		371	* \$38.40
		372	* \$38.50
		373	* \$38.60
		374	* \$38.70
		375	* \$38.80
		376	* \$38.90
		377	* \$39.00
		378	* \$39.10
		379	* \$39.20
		380	* \$39.30
		381	* \$39.40
		382	* \$39.50
		383	* \$39.60
		384	* \$39.70
		385	* \$39.80
		386	* \$39.90
		387	* \$40.00
		388	* \$40.10
		389	* \$40.20
		390	* \$40.30

well as the star opposite the number of days for which storage is charged. He then gives the lower slip to the passenger as his receipt for the payment. The amount paid by the passenger is shown along with the number of days charged for. After payment has been made, the middle part of the check is sent to the Auditor of Passenger Accounts, who checks up the amount punched with the amount of money received, and also checks up the numbers of all the stubs previously received with the numbers of the checks sent in. The payment then goes through the regular process of being entered in the accounts.

In this way there is a check on every one concerned in the transaction, a receipt to the passenger for his payment, and a convenient record of all amounts received for storage. This form has been in use on the New York Central & Hudson River since Sept. 1, 1905, and has been a most satisfactory improvement over the former method. It is now standard on all of the New York Central Lines. For the information we are indebted to Mr. J. L. Ferris, Auditor of Passenger Accounts of the New York Central.

Proposed Card Way Bill; Diversion of Cars.

At the meeting of car service officers in Denver, May 17, the committee on car service made a report recommending for adoption a uniform card way bill for use both in local and interline business. A reduced fac-simile of this waybill is shown herewith.

NORTH AND SOUTH RAILWAY		GENERAL INSTRUCTIONS	
CARD WAYBILL FOR BOTH INTERLINE AND LOCAL USE			
No. _____	Date _____	Regular billing must be promptly forwarded under cover to point of billing to, no per diem card Way-bills.	
Initial _____	Car No. _____	In the absence of regular billing this Card Way-bill must accompany car to final destination, unless otherwise ordered.	
Transferred to _____	Car No. _____	If load is transferred state reasons of transfer under head of "AMMEX."	
At _____	Date _____	When routing or destination is changed or loading transferred in transit, the Card Way-bill must be corrected accordingly.	
Billed from _____		To correct the Card Way-bill draw a pen stroke through the original marks and write the correction in ink, taking care to leave the original marks so they can be easily read, and on back of the Card Way-bill give authority for correction, etc., with name of party making correction.	
Billed to _____		When actual weight cannot be ascertained at point of shipment, estimated weight must be entered in space provided, and the cars must be weighed at the points and under conditions prescribed by the individual roads involved.	
Final Destination—City _____		This Interline Card Way-bill must be filled out with either ink or indelible pencil, and a press copy taken by the Agent making it.	
County _____	State _____	SPECIAL INSTRUCTIONS (To be inserted by Railroad issuing the bill.)	
Contents _____			
Consigner _____			
Consignee _____			
Special Notations as to icing, lighter, etc., grading, etc. _____		REMARKS	
Marked Capacity of Car _____ Lbs.			
ESTIMATED WEIGHT	ACTUAL WEIGHT		
Gross _____ Lbs.	Gross _____ Lbs.		
Tare _____ Lbs.	Tare _____ Lbs.		
Net _____ Lbs.	Net _____ Lbs.		
Weighted at _____ Date _____ 1906			
Combined Weight of Car and Loading for Engine rating _____ Tons			
SEE OTHER SIDE		SEE OTHER SIDE	

Proposed Uniform Card Way Bill

The committee deems the necessity for a uniform card waybill urgent and recommends that the matter be referred at once to the American Railway Association.

This committee also reported on the diversion of cars, setting forth that when traffic is heavy the transferring of loads at junctions is too costly to be tolerated; that diversion for the purpose of breaking penalty is a "uniform practice;" and that immediate action ought to be taken to devise means to protect car owners. The committee, however, throws no light on the way to carry out this recommendation. A table is given with the report showing the number of apparent diversions of box cars shown in the records of cars, of 1,000 consecutive numbers, on each of 52 different roads, taken from the records for the month of November, 1905. Some of the typical items in this report are:

Item No. 1; number of cars 1,000; times off line 938; diversions 241.

Item No. 6; number of cars 1,000; times off line 350; diversions 94.

Item No. 17; number of cars 1,000; times off line 1,275; diversions 17.

Item No. 23; number of cars 993; times off line 986; diversions 866.

The officers of the several roads responding to the request for data for this table make some significant comments. One of them says that the handling of cars and of records on certain

roads is "very rotten." One says that his equipment is misused, and is misused more than before the per diem rule went into effect; but he cannot afford the clerical service necessary to make up the data asked for. One officer, who on January 1 had only 27 per cent. of his cars at home, declines to make up a detailed statement, because he believes that a rule for penalizing diversions is impracticable; the benefits of such a penalty rule would not be sufficient to warrant the cost of fixing the responsibility for diversions.

Leaves from a Railroad Officer's Note Book.

[Mr. W. W. Hoy, of Johannesburg, South Africa, Chief Traffic Manager of the Central South African Railways, spent about half of the year 1905 inspecting American and European railroads. The appendix to his formal report to his company, consisting of "brief notes on various railway practices," has the freshness and charm which belongs to honest jottings of first impressions, although a trifle more care would have prevented his occasional errors.]

Trains are unpunctual in America as elsewhere, but there is more room for improvement in the west than in the east. I should have thought that this branch of railroad working would have received more attention from the American railway administrations.

The fast trains in the east maintain exceptionally good time, and I quote the arrival of the "Twentieth Century Limited" in New York, for the period May 16th to June 14th inclusive, as an example of the good running maintained:

23 days	on time.
1 day	6 minutes late.
2 days	7 minutes late.
2 days	10 minutes late.
1 day	22 minutes late.
1 day	24 minutes late.

If the express trains are more than a hour late, a refund of the difference between the express fare paid and the ordinary fare is made to the passengers.

The practice of starting the train by the guard's "rightaway" whistle, or by a warning bell, has been abolished.

Trains do not carry destination boards; the names of stations are called out by the porters who travel on the train.

I saw only one destination board during the whole of the time I was in America, and that was only brought into use during the time the train was in the station.

Two, three and even four baggage vans are run on the same train although not one may be even a quarter full.

Baggage on American railroads is generally very roughly handled.

As a rule the guard's and baggage vans are next to the engine, but the guard or brakeman generally rides in the rear vehicle of the train.

The staff of a train generally consists of:

- 1 Company's conductor.
- 1 Brakeman.
- 1 Baggage man to each baggage car attached to the train.
- 1 Pullman porter to each car.
- 1 Pullman conductor—occasionally—for inspecting.
- 1 Inspector in charge of dining car.
- 2 Cooks.
- 1 Pantryman.
- 4 Waiters.

Passenger trains consist of from five to 15 vehicles.

Conductors and trainmen are supplied with food on the dining car during the "last call" for meals.

Certain trains are provided with additional facilities in order to popularize particular routes of transport, e.g. "The Twentieth Century Limited" has, in addition to the usual accommodation afforded on express trains, the following traveling facilities which add very materially to the comfort of the traveler: Barber's shop and bath room; library in the observation car; woodwork and decorations of a most costly description; drawing room and compartment cars; a smoking-room car—generally placed at the end of the train opposite to the observation car—similar in all respects to that of a club house; a shorthand writer and typist; a bulletin containing all the latest news and the most recent share quotations; telephonic communication on board the train to the last moment before departure and from the moment of arrival at destination.

I observed several instances of railroad officials in uniform smoking whilst in attendance on passenger trains, and many cases where the conductors, car attendants and porters were characterized by their rudeness, want of courtesy, and familiarity with the passengers. There was a distinct lack of supervision on the part of the inspector on most of the cars.

Lighting of trains is performed by gas and electricity. The latter system of lighting is gaining ground rapidly and is generated by steam turbine power or by axle driven motors. Repairs of a minor kind to rolling stock are effected whilst the trucks are being unloaded in the station yards.

The coaling, watering and sanding of engines is generally performed in two or three minutes.

When trains move in the station yards or approach level crossings a bell is kept continuously ringing as a warning to the staff, and in large stations where many engines are employed the deafening noise of bell ringing seemed to me to be more perplexing than anything else.

Combined locomotive and maintenance shops are under the control of the Superintendents of Motive Power.

In all orders for new passenger stock the construction is now generally stipulated to be of steel.

No smoking is allowed in locomotive works or carriage repair shops.

Piece work is in general operation, except on the western lines, where the labor organizations still have considerable power.

Smaller wheels are used on goods rolling stock in America than in Europe.

Electric car lines are contemplated between San Jose and San Francisco, a distance of 50 miles, and New York and Washington, a distance of 225 miles.

Through freight bookings are in force from America to Great Britain and the Continent, and also to some of the British Colonies.

Inter-line invoicing and payment of charges is in daily operation with foreign roads amongst American railroads.

"Paid on" traffic is generally checked every day.

In providing for the conveyance of fruit traffic every effort is made to arrange for through truck loads. The senders combine and arrange so that with a regular fruit traffic through trucks can be arranged.

Fencing of railroads is compulsory in the western states, but only optional in the east. However, owing to the remarkable value placed upon all stock killed on the railroad line, the majority of the eastern railroads fence all their tracks.

The Pullman porters travel continuously in their cars wherever the latter are sent, and are responsible for all fittings and equipment of the car. They are responsible for the boot cleaning, the brushing of passengers' clothes, and the cleanliness of the interior of the carriages, besides their ordinary duty of having to account for the linen equipment which necessarily accompanies each car.

In addition to being responsible for all the equipment of the car, the porters are liable to a fortnightly check being exercised upon the car and its contents. Clean linen is only given in exchange for its equivalent in soiled equipment.

The brass work of saloons, both interior and exterior, is not very well kept.

Refreshments, mineral waters, fruit, cigars and cigarettes can be obtained on all through trains, as well as books, papers and magazines.

Iced filtered spring water is provided on all trains, both through and local, and the arrangements for refilling and cleansing the filters are excellent. The handling of ice, however, is performed by an employee who is at other times engaged in work of a decidedly dirty nature.

The saloons on through trains are very hot; no fans or other means of ventilation are provided, with the exception of wind gages.

One feature of the Denver-Rio Grande route is the provision of open observation cars. The open balcony has fixed seats with accommodation for 16 persons, and camp stools and chairs for another 36 passengers. An additional open observation car is attached to the train while passing through the Royal Gorge, and the vehicle has a seating capacity of 70.

This railroad also issues about 15 various publications—magazines and descriptive pamphlets—and it is estimated that the company has spent close on \$2,000,000 in this connection. It is contended, however, that this sum has been more than recouped long ago.

The bedding arrangements are well organized. The clean mattresses are kept in the top bunks, whilst the pillow slips are removed from the pillows and are placed in a box at the back of the passenger's seat. Clean slips are provided every night. Bedding and linen are excellently kept and scrupulously clean.

Compartments have tapestry lace antimacassars for each passenger's head rest. These are renewed before every journey, and oftener if required.

All goods must be properly protected before being accepted by the railroad companies for despatch and transport. Fragile goods must be packed in crates. No goods are allowed to be left on railroad platforms.

A feature on some lines is that maintenance gangs are not stationed along any particular section, but large "flying squads" are sent out by ballast trains for the purpose of examining and effecting the necessary repairs at periodical intervals. An inspection and report of the line is made before the special ballast or repairing train is despatched.

The Delaware & Hudson boasts of a "dustless" track, due to the application of crude petroleum oil to the permanent way. After the first cost of installation the process is said to be carried out at an infinitesimal cost compared with the benefits derived therefrom. Renewals of the oil covering are carried out during the spring months.

Regrading, tunnelling and improvement of the permanent way

is a subject which is receiving constant attention. Steel bridges are replacing those of wood, and in most large cities, and more particularly in the Northern states, overhead viaducts are being constructed so as to avoid the numerous level crossings.

Most main line stations are only provided with very low level platforms. The platforms at suburban stations, however, are of the high level type.

The signals on the Southern Pacific are placed on the center of the platform, and worked by one wire for each signal from the booking office.

Discs, some distance from the points, and worked in conjunction with the latter, are in common use.

Telephones, in boxes, are placed at appointed spots along the line, for use in cases of emergency.

All the up-to-date stations are provided with subways for dealing with the baggage and express company's traffic. In fact, the general practice seems to be to provide subways in preference to overhead bridges, space being thereby largely economized in buildings where a large area is required for other purposes.

There are several powerful associations connected with the railroads of the North American continent. These make for progress in all directions, and it is only possible to comprehend their influence after a study of the railroad history of the states.

The principal organizations are the Railway Supply Men's Association, the Master Car Builders' Association, the Master Mechanics' Association, Railway Accountants' Association and the American Railway Association.

This last body of officials is the most powerful in its authority, and its influence is very far reaching. It represents 95 per cent. of the North American railroads.

It has introduced standard time, framed a uniform code of signals, a standard code of train rules with all their variations covering movements by telegraphic orders, block signals, interlocking, etc., uniform couplers, the regulation of principles governing the use of safety appliances, standard and wheel track gages, car service rules, and more recently the per diem car rules and regulations.

An instruction car for training railroad employees in the use of the air-brake is employed on the several railroads of the states. The Westinghouse Air-Brake Company supply the car, fit it up with every description of air-brake appliances, and furnish an instructor free of cost to the railroad companies. Free transportation for training purposes is afforded by all the companies interested in the employment of the car. The car has won a well deserved reputation for utility wherever it has been in use.

At Chicago the street transport question has become so acute that a company has been formed to connect all the principal warehouses in the city by means of an underground railroad transport service. The first section was just about to be opened whilst I was in Chicago. The scheme presented itself as being of great assistance in the solving of a problem which is a vexed question in other cities besides Chicago.

(To be continued.)

A Graphical Solution of the Knee-brace Problem.

BY MALVERD A. HOWE.

Director, Dep't Civil Engineering and Architecture, Rose Polytechnic Inst.

The actual stresses in knee braces between columns and roof trusses will probably never be known exactly as there are so many variable factors entering the question. In the usual construction where columns are bolted to masonry pedestals at the bottom, either

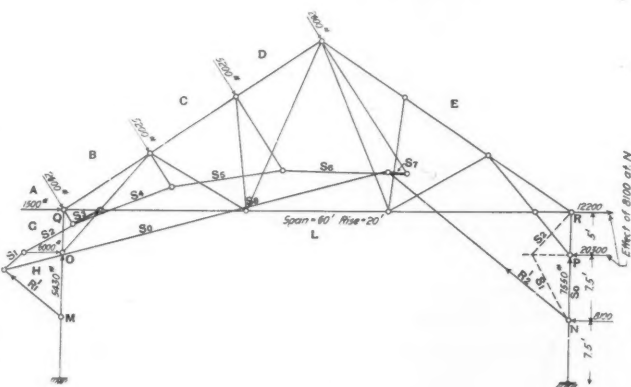


Fig. 1.

riveted or bolted to the trusses at the top and with the knee-braces riveted at both ends, the degree to which these connections may be considered fixed is a question leading to many arguments and differences of opinion. It is not proposed to enter into this question at

all but to show how the stresses in all the members of the framework can be found graphically under a given assumption.

Assume, for example, that the bottom of the columns are sufficiently fixed so that the point of zero moment is midway between the bottom and the attachment of the knee-braces, and that the top attachments and those of the knee-braces to the columns such that they may be considered as pin connections. Taking the truss and loading shown in Fig. 1, it is evident that the external forces must be in equilibrium, and, unless the points M and N are unlike in some particular, the reactions at these points will be parallel to the resultant of the given forces and the sum of the two reactions equal this resultant in magnitude. This is shown by HE, Fig. 2, which represents the direction and magnitude of the resultant of the given forces. Assume a convenient point as a pole and con-

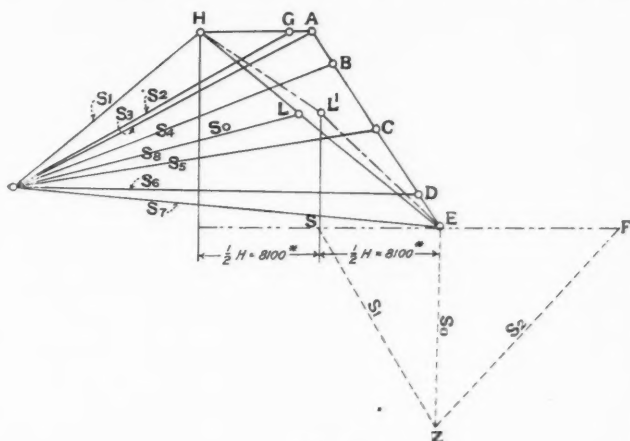


Fig. 2.

struct an equilibrium polygon in the usual manner and draw the string So, dividing HE into two parts at L. $HL = R'_1$ = the reaction at M and $LE = R'_2$ = the reaction at N. These reactions are correct in direction and magnitude unless some condition is imposed to change them.

If there are no bending moments at M and N and these points are prevented from moving vertically, the vertical components of the reactions must remain constant even in the extreme case where M may be assumed as a pin and N as resting on rollers.

Any assumption may be made as to the horizontal reactions at these points as long as their sum equals the horizontal component of HE, Fig. 2. It is customary to assume these reactions as equal. If this is the case, then the reaction at M is HL^1 and that at N, $L'E$, as shown in Fig. 2.

The next step is to find the effect of these reactions at the points O, Q, P and R. The vertical components will act as vertical reactions at O and P. The horizontal components will produce bending moments at O and P, and, in effect, horizontal forces at O, P, Q and R. To determine these forces, in Fig. 2, assume a pole vertically below E and draw the strings S, and S, from the extremi-

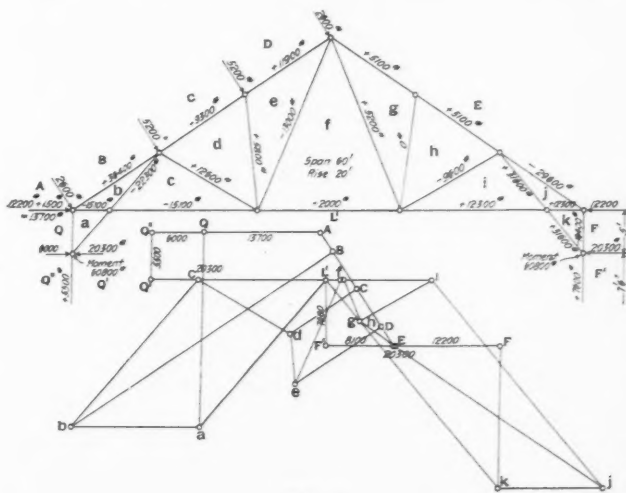


Fig. 3.

ties of the horizontal component as shown. Then, in Fig. 1, from N draw S_1 and S_2 in the usual manner and complete the equilibrium polygon with S_2 . In Fig. 2 draw ZF parallel to S_2 of Fig. 1, then SE is the force at P and FE the force at R, produced by the action

of the horizontal reaction at N. The forces at O and Q are, of course, the same as found at P and R respectively. With these forces determined the problem is solved in the usual manner as shown in Fig. 3.

The Denver, Northwestern & Pacific.

The city of Denver, although far and away the most important city between the Missouri river and the Pacific coast, has always been handicapped commercially by the fact that it is not on any of the direct through routes to Pacific tidewater. Situated as it is at the eastern base of the Rocky Mountains, with numerous railroads entering it from the east, it lacks a direct route to the westward towards California and the great Puget Sound region. The barrier of the Rocky Mountain range, which stretches north and south some 25 miles west of the city, has always until recently been effective in preventing direct railroad connection with the west. In order to reach the coast from Denver it is necessary to go either 119 miles southeast to Pueblo before starting west over the Denver & Rio Grande, thence to bend almost as far north again on the way across Colorado, or to go north 167 miles to Cheyenne, Wyo., and thence west over the Union Pacific.

From the east, the Chicago, Burlington & Quincy, two lines of the Union Pacific, the Chicago, Rock Island & Pacific by trackage rights over the Union Pacific, the Atchison, Topeka & Santa Fe, and the Colorado & Southern, all converge at Denver. There have been numerous plans in years past to build a line straight westward from the city which, in addition to providing a direct outlet for Denver and its eastern connections, should open up a large territory in northwestern Colorado and eastern Utah to settlement. Owing to the great cost of construction immediately west of Denver necessary in crossing the Continental Divide of the Rocky Mountains no such direct line has until recently been built.

It remained for Mr. David H. Moffat, a banker and prominent citizen of Denver, to bring about the construction of such a line. The Denver, Northwestern & Pacific, more generally known as the Moffat road, already extends across the summit of the Continental Divide and is being steadily built westward toward Salt Lake City, Utah. In the *Railroad Gazette* of March 17, 1905, there was published a description of this line, including many of its engineering features. In order to include more recent developments, and to give a general summary of the project brought down to date, this further description is presented.

The Denver, Northwestern & Pacific was organized in July, 1902. The object of its promoters was twofold: First, to develop by a railroad the great area from Denver to Salt Lake City lying between the Union Pacific on the north and the Denver & Rio Grande on the south, an extent of territory larger than the whole area of the state of Pennsylvania; and second, to build a line which should furnish a main artery for traffic east and west and secure a large through business.

The region to be developed by this railroad between the Continental Range in Colorado on the east and the Wahsatch Range in Utah on the west, untouched by existing railroads, is approximately 300 miles long by 100 to 180 miles north and south. It includes Grand, Routt and Rio Blanco Counties in Colorado and Uintah and Wahsatch Counties in Utah. This is a region rich in natural resources, both agricultural and mineral. Immediately west of the Continental Divide are extensive forests of white pine and white spruce timber which finds a ready market in Denver. At Hot Sulphur Springs and also at Steamboat Springs are fine groups of mineral springs which should make these places desirable health and pleasure resorts. Throughout most of Routt County and a large part of Rio Blanco County are extensive deposits of both bituminous and (Colorado) anthracite coal. The area of the anthracite coal is estimated to be 100 square miles in extent, with 12 distinct veins overlying each other to an aggregate thickness of 75 feet. In northeastern Utah are immense beds of hydrocarbon products, such as gilsonite, grahamite, elaterite and asphaltum, which are of large commercial value and should furnish a large traffic to a railroad. The Denver, Northwestern & Pacific is to run most of the way through this region in the river valleys, where there are good opportunities for agriculture. Back from the rivers are large tracts of grazing lands suitable for stock raising. Throughout this whole length of 300 miles there are no stretches of waste or desert land, the country all the way being capable of some kind of useful development.

The second purpose of the promoters—to make the road an efficient through route—can be best discussed after noting conditions met with and progress already made in the construction of the road. The distance from Denver to Salt Lake City by the Moffat road is approximately 575 miles. Of this, 109 miles to Sulphur Springs has been in operation since last September and track is laid on 20 miles more to Kremmling. Beyond Kremmling the building of 70 miles is already under contract, with grading work under way with a large force of men. Completion of this section will bring the road into the coal fields of Routt County early in 1907.

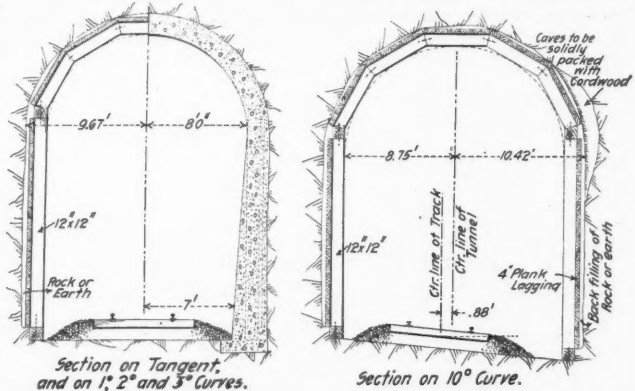
The road has two principal divides or summits to cross and

one minor summit. The Continental Divide and the Wahsatch Range are the principal summits and the divide between the Grand and Yampa rivers the minor summit. The rest of the line, amounting to about three-quarters of the work, is to be in river valleys where grades and curvature are favorable. On those parts of the line which cross the three principal summits the maximum grade of the completed road is to be 2 per cent. On the other parts of the line 1 per cent. is the maximum. The heavier grades will be bunched so that by using helper engines the train load which can be handled on a 1 per cent. grade with one locomotive can be maintained solid over the whole line. On the mountain parts of the line, 10 deg. is to be the maximum curvature, with the exception that in a few close canyons, 11 or 12 deg. curves have been temporarily used in first construction in order to save excessive tunneling. The line is so laid out at these points, however, that eventually these curves can be reduced to the standard maximum of 10 deg. curve. On the valley portion of the line 6 deg. will be the maximum curvature.

The accompanying photographs give a good idea of the character of the country through which the Denver end of the line runs. From the Denver terminal the road strikes a little north of west straight for the mountains. The development along the Trout Range of the Rockies is shown in the photograph which includes the second, third and fourth tunnels on the line. The engineering policy has been to avoid high trestles on side hills and to preserve a good alignment by tunneling the spurs of the hills and keeping the line well into the side of the mountain. On the line between mile posts 23 and 36 west of Denver, along the ragged sides of the South Boulder river valley, there are in the 13 miles of road 30 tunnels, from 73 to 1,729 ft. long, aggregating 16,000 ft. long. In this same distance there are only two trestle bridges. These were built because there was no material for the openings readily available. They are later to be filled in, the drainage to be carried underneath by cast-iron pipe. Normal sections of the standard tunnel both for straight and curved line are given herewith; also a plan of the standard trestle bridge.

After traversing the South Boulder canyon the line reaches the head of the South Boulder river about two miles north of James Peak. This is on the Atlantic slope of the range. Near here in actual distance on the Pacific slope of the Continental Divide the east branch of the Fraser river is close to the summit of the range. Careful surveys have shown that at this point, 52 miles out of Denver, is the shortest distance through the range, and that a tunnel 2.6 miles long at an elevation of 9,930 ft. (2,200 ft. below the summit) will bring the line to the other side of the Continental

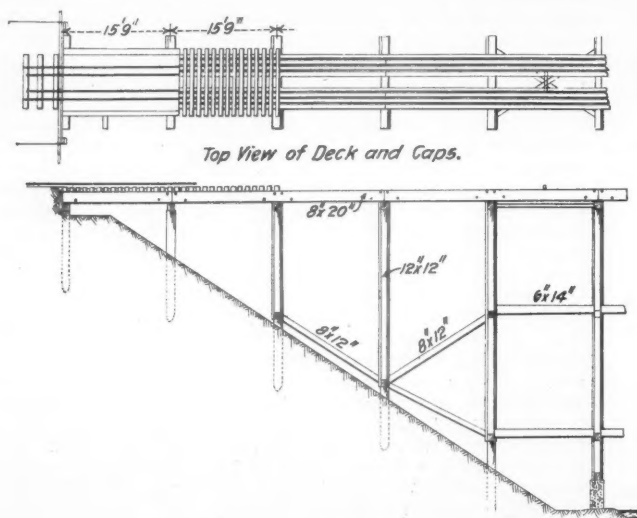
of the tunnel on the west side. Vasquez, now 81 miles from Denver, will therefore be only 56 miles away when the tunnel line is in operation. There is over the Divide a practically even 4 per cent. grade equated 0.035 ft. per degree of curvature, except at sidings, where a slack grade of about 2 per cent. is introduced for about 2,000 ft. The maximum curvature is 16 degrees. There are two tunnels, one of them underneath an overhead loop on the descent of the west side of the range between the summit and Arrow, a new town formerly called Arrowhead. After the completion of the main range tunnel it is not likely that the temporary line will be abandoned, but instead operated during the summer months for



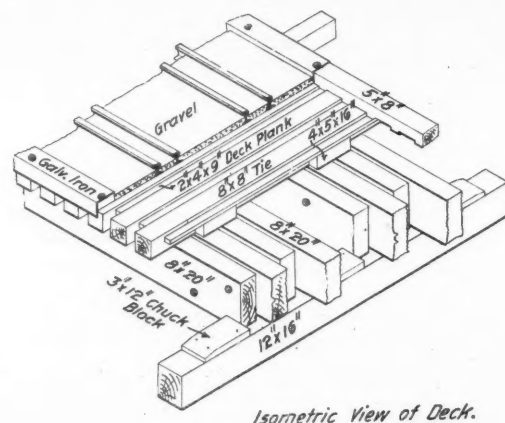
Cross Sections of Standard Tunnels—Denver, Northwestern & Pacific.

excursions. It crosses the summit of the Divide at an elevation of 11,660 ft. through remarkably wonderful mountain scenery.

In view of the difficult character of the construction, there are included in this description certain engineering data, some of which was referred to in the previous article. The mountainous portions of the line are generally in a granite formation; the valley portions, in alternating granite and sandstone, with a large percentage of loose disintegrated material, clay and soil. Widths of roadbed and excavations are 20 ft. in rock and 22 ft. in loose materials. Rock fills on embankments are 16 ft., and fills of earth and loose material 18 ft. wide. Side slopes are regulated according to the material encountered in excavation, ranging from $\frac{1}{4}$ to 1 in rock cuts to 1



Standard Trestle Bridge—Denver, Northwestern & Pacific.



Isometric View of Deck.

Divide without exceeding a 2 per cent. maximum grade. Starting with the tunnel elevation of 9,930 ft. at each portal, a grade of 0.25 per cent. rising towards the tunnel center from each end is projected. The same grade is to be extended outside the tunnel at each end to accommodate a small yard. Work on the Continental Divide tunnel is already under way and it is hoped to have it finished early in 1908.

Pending the completion of this tunnel, the road has been extended over the summit of the Continental Divide by means of a temporary line over the main range. By building this, it has been possible to push construction beyond the Divide into Middle Park. Thus, by the time the tunnel is finished, more than half of the whole line will be in operation. The temporary line is 28 miles long, from Ladora Junction, the site of the tunnel portal on the east side of the range, to Vasquez Junction, the site of the portal

to 1 in earth. Rock embankments stand $1\frac{1}{2}$ to 1; earth and loose material, $1\frac{1}{2}$ to 1. The normal tunnel section is 16 ft. wide and 24 ft. high from sub-grade, or 22 ft. high above top of rail. On curves the width is increased to a maximum of $17\frac{1}{2}$ ft. for a 10 deg. curve, in which case, as shown on the plan, the tunnel-center is thrown 0.88 ft. towards the inside of the curve to preserve proper clearance on both sides. The mountain ridges over the tunnels through the South Boulder Canyon range from 60 ft. to 600 ft. above grade. The rock is in many cases seamy or "blocky," requiring timber lining. This is all 12 x 12 material, the posts set on a sill tapped with a wall plate on which are five segment arch timbers of equal length. Where, in a few cases, wet decomposed material was found, 8 in. x 20 in. timbers were inserted for posts and segment stuff and wall plates were left out.

In addition to the resources of the country west of the Con-



View of Canyon Country from Tunnel 28—Denver, Northwestern & Pacific.

tinental Divide, in the plains region near Denver are good agricultural lands and extensive deposits of lignite coal, which is now being mined and shipped over the Denver, Northwestern & Pacific to Denver. Between the foothills and the main range and in the mountains west of the range are valuable deposits of precious minerals. Gilpin County, through which the road passes, is the oldest and one of the most extensive mining counties in the state.

The Denver, Northwestern & Pacific has had some difficulty in securing satisfactory terminals at Denver. Construction westward was begun from Utah Junction, on the Colorado & Southern and Chicago, Burlington & Quincy, four miles northwest of the Denver Union Station. Later the Northwestern Terminal Railroad Company was incorporated to build a line for the Denver, Northwestern & Pacific from Utah Junction into the central part of the city of Denver. About 229 acres of ground in the freight district of Denver and near the grounds of the other railroads entering the city have been secured, and a good sized brick freight and passenger station is now being built on Fifteenth street about four blocks from the Union Station used by the other roads.

In regard to the desire of the promoters to make the road an important through line a brief comparison of grades and distance over the new road and over existing lines is interesting. By the Denver & Rio Grande it is 119 miles from Denver to Pueblo and 624 miles from Pueblo to Salt Lake City—total 743 miles from Denver to Salt Lake. The ruling grade westbound is 2.40 per cent. and eastbound 4 per cent. By the Union Pacific, it is 107 miles from Denver to Cheyenne, and 485 miles from Cheyenne to Ogden, or 522 miles from Cheyenne to Salt Lake City, a total of 592 miles from Denver to Ogden, or 629 miles from Denver to Salt Lake. The maximum grades on this section are 82 ft. to the mile (1.55 per cent.) between Cheyenne and Laramie westbound, and 96 ft. to the mile (1.82 per cent.) between Ogden and Wahsatch eastbound. The highest elevation reached is 8,011 ft. at Sherman, just west of Cheyenne, and another summit 7,225 ft. high is crossed at Alta-



Development on Pacific Slope of the Continental Divide—Denver, Northwestern & Pacific.



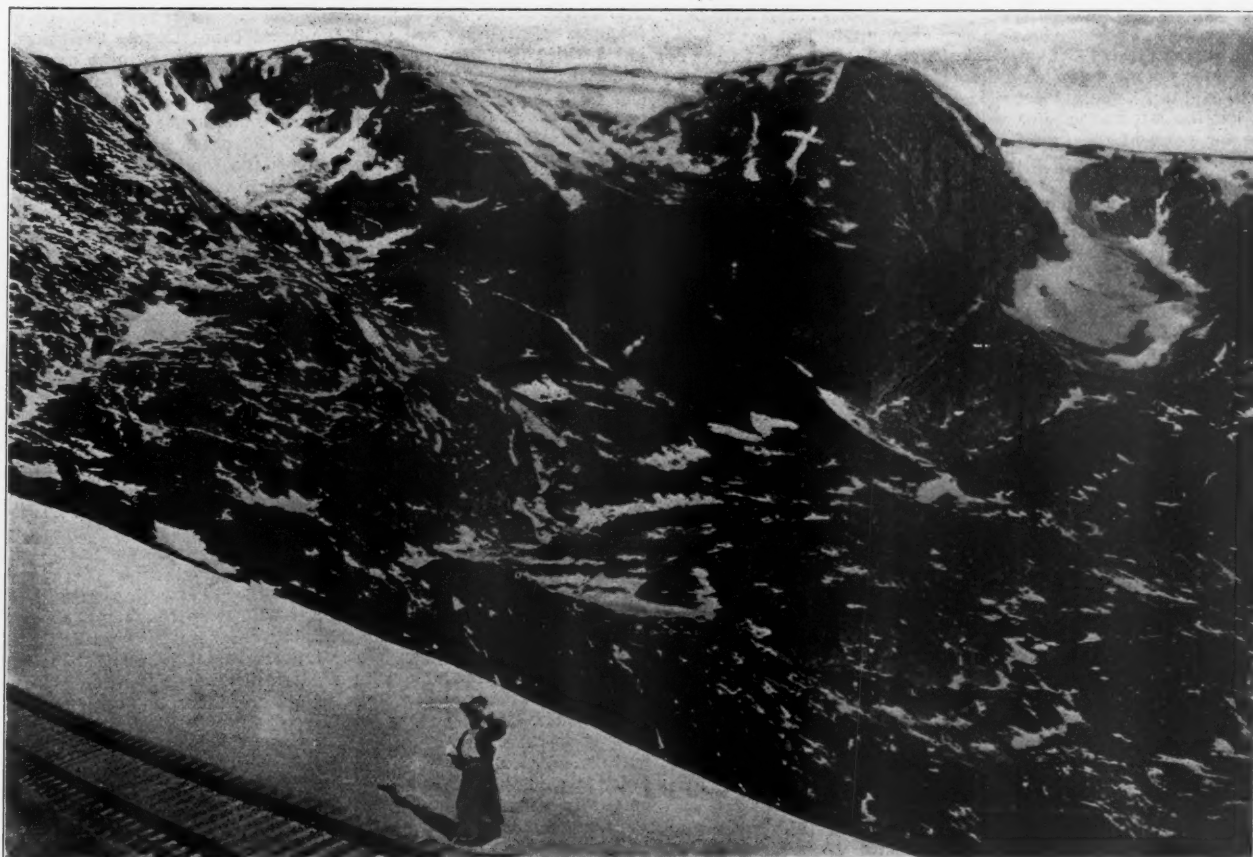
Typical Canyon Scenery; South Boulder Creek Near Rollinsville, Colo.—Denver, Northwestern & Pacific.



View from Rainbow Cut in the Foothills, Showing Development Along Trout Range of the Rockies and Tunnels 2, 3, and 4—Denver, Northwestern & Pacific.



South Boulder Canyon and Tunnel 28—Denver, Northwestern & Pacific.



View of Rollins Pass, Crest of the Continental Divide, Crossed at Elevation of 11,600 Feet by Temporary Main Line of the Denver, Northwestern & Pacific.

mont, nearly 100 miles east of Ogden. By the Denver, Northwestern & Pacific it is 570 miles from Denver to Salt Lake City, and with the completion of the Main Range tunnel, the maximum grade will be 2 per cent. both east and westbound. The highest summit, as already mentioned, is 9,930 ft. The Moffat road, therefore, will be shorter than either of the other routes and will have lower grades in each direction than the Denver & Rio Grande and steeper grades in each direction and higher summits to cross than the Union Pacific. It appears, therefore, that its completion should have small effect on the through traffic of the Union Pacific, but it is not at all impossible that it may be a severe competitor of the Denver & Rio Grande for through traffic across the state of Colorado.

Ever since the road was organized there have been numerous rumors of its sale to one or other of the existing systems, but thus far it seems to have remained independent. The extent of its success when completed, particularly as a through carrier, is one of the most interesting conjectures in the western railroad situation.

A British View of Large Locomotive Boilers.

Mr. J. G. Churchward recently presented a paper on "Large Locomotive Boilers" before the Institution of Mechanical Engineers, which he opened with the statement that locomotive engineers have now apparently settled down to the use of one of two types of boiler for very large engines; the wide firebox extending over the frames and wheels, and the long narrow box sloping up over the axles behind the main drivers.

In Great Britain the contracted loading-gage prohibits the use of the wide firebox type over wheels larger than 4 ft. 6 in. diameter, so that it is not being used so generally as in America, where it is becoming practically universal. In America the great power of engines now employed renders the wide firebox a necessity, but in Great Britain, where the coal burnt per mile is much less, few boilers of this kind have been built.

Much more experience has been gained with the wide box in America than in England and, so far as the author has been able to ascertain, it has been found there that the poorer coals in large quantities can be burnt with much greater facility and economy in this type than in the narrow pattern. This advantage is offset to some extent by the fact that, when standing there is considerable waste in the wide grates as compared with the narrow, and this is, of course, serious when goods trains are kept standing about; as is often the case.

A much more serious trouble has been found in the leaking of tubes in these boilers. All methods of tube expanding have been tried, and also much wider spacing, even up to and over 1 in., without curing the trouble. The reduction of the depth of the firebox, in order to get a long box sloping over the trailing wheels of coupled engines, certainly increased the trouble from leakage of stays, but the alternative of a wide firebox entails a much heavier engine for most of the types, and then apparently tube-trouble is increased. The wide firebox evidently requires a higher standard of skill in the fireman, for unless the grate is kept well and evenly covered, there is a tendency to have an excess of air, reducing efficiency and increasing tube-trouble. With modern high pressures the temperature of evaporation is so much increased that the provision for circulation which was sufficient for the lower pressure formerly used is doubtless insufficient. Boilers in which this provision has been made have shown a very marked reduction in tube and stay troubles.

It is probable that, in the wider boxes, the main mass of the fire being so much nearer the tube plate has a bad effect on the tubes as the intensity of the temperature at the tube plate must necessarily be much increased. The extra width of box has enabled the tubes to be put much too near the sides of the barrel. When this is done, the water, to feed up the spaces between the tubes near the back tube plate, has to be drawn almost entirely from the front of the barrel, and it is possible that in some cases the space left for this purpose is inadequate. It will probably be found that neglect of this consideration is the cause of three-fourths of the tube trouble. In some boilers, an effort has been made to provide for this upward circulation near the back tube plate by leaving a space between the tube and barrel from top to bottom, of a sectional area equal to the combined area of the vertical spaces between the tubes at all points, with a balance to provide for the water coming back from the front of the barrel to feed the water spaces of the firebox. There is no doubt that the upward draught of water through the spaces between the tubes for two feet from the back tube plate is very strong indeed, and in all probability this is enough to prevent the necessary feed of water down the spaces of the firebox unless ample area is given, so causing stay as well as tube trouble.

By putting the clack box or check for both injectors under the barrel, and providing an internal nozzle directing the feed back towards the firebox, considerable assistance is probably given in feeding "solid" water back to the firebox and the hottest part of the tubes. It is generally supposed that the circulation in a

locomotive boiler proceeds along the bottom of the barrel from the front end down the firebox front and up the sides and back of the firebox. The author two or three years ago fitted a number of vanes in a boiler with spindles passing through lightly packed glands to the outside, with indicators to show the direction of the flow of water. Observations showed that the circulation was generally as stated above, but a little alteration of the firing had the effect of materially changing the direction of the currents and even of completely reversing them.

These experiments suggested the desirability of bringing a circulating pipe from the front of the barrel, bifurcated to each side of the firebox at the foundation ring, but the consideration of possible danger from an outside pipe open to the boiler, caused the experiments to be abandoned. The experiment has since been made in America, and it is reported that great reduction of trouble with slide sheets resulted. The extended length of tubes seen in some designs of wide firebox boilers is due to the use of six-coupled wheels in front of the firebox. Experience of long tubes appears to be quite satisfactory, and they certainly keep up the economical efficiency of the boiler when it is being forced to the limit of its capacity. In this respect the long tube fulfils the same function as the Serve tube (which is favored so much on the Continent) performs in boilers with shorter barrels.

The ratio of diameter to length of the tube undoubtedly has a most important bearing upon the steaming qualities of the boiler and upon the efficiency of the heat absorption. This is more particularly noticeable when the boilers are being worked to the limit of their capacity. If 2-in. tubes are employed in barrels 11 to 12 ft. long, when the boiler is being forced the length is not sufficient to absorb the heat from the amount of gases that a 2-in. tube will pass, and overheating and waste result. The amount of tube-leaking which is experienced with modern wide boxes in America has brought up again the idea that the spacing should be wider, 1 in. instead of $\frac{3}{4}$ in., but, from the investigations of a Master Mechanics' Committee, it appears that the wider spacing does not cure the trouble. It is clearly of no use to provide wider spaces for the upward current, unless equivalent area is provided for the downward water.

The gradual extension of the practice of making the top of the firebox and casing flat instead of round is noticeable. On the Great Western Railway (England) less trouble has been experienced with the flat-top firebox than with the round top, although no slingstays of any kind are used. The flat top has the important advantage of increasing the area of the water line at the hottest part of the boiler, and so materially contributes to the reduction of foaming. This, combined with the coned connection to the barrel, has enabled the dome, always a source of weakness, to be entirely dispensed with and drier steam obtained. The author some years ago made an experiment to settle this much-disputed point. Two identical engines and boilers were taken, one boiler having a dome in the usual position on the barrel, the other having no dome, the steam being taken by a pipe from the top of the flat firebox casing. The engine without the dome proved to be decidedly freer from priming than the other. The liberal dimension of 2 ft. between the top of the firebox and the inside of the casing no doubt contributed to this satisfactory result. The coned barrel connection, in addition to providing a greater area of water line, also gives a larger steam capacity, and, by the larger diameter being arranged to coincide with the line of the firebox tube-plate, much more waterspace at the sides of the tubes is possible. On consideration of the great intensity of temperature at the firebox plate as compared with that at the smoke-box plate, the advantage of the arrangement is obvious.

There is really little to be said as to firebox stays. The stay question is in very much the same position in which it has always been. For the present high pressures, copper is still being used below the fire-line with closer spacing down to $3\frac{1}{4}$ in. pitch. Bronze is often used above the fire, and the boilers of the De Glehn compounds are so fitted. In America Yorkshire iron is still used, and recently Professor Hibbard, experimenting there on some iron stays, arrived at the astonishing fact that the ductility of iron stays increased instead of diminished with the higher pressures now common. The author is using a few Taylor-iron stays experimentally with a view of ascertaining whether this material is more durable than copper, under the conditions brought about by the increased temperatures in modern boilers. Experiments are being made by many engineers with water-tubes in fireboxes—notably by Mr. Drummond, of the London & South Western Railway, who is so satisfied with the results that he is building this type entirely. Unfortunately, it is a necessity to have a deep firebox in order to employ water-tubes effectively, or it is probable that many engineers would be following Mr. Drummond's example.

The employment of a superheater is having an extended trial in Germany and also in Canada. This affords the prospect of obtaining the same steam efficiency by the use of, say, 175 lbs. pressure, as by employing the pressures of, say, 200 lbs. to 225 lbs. This, no doubt, offers some prospect of success, and is attractive



The Lincoln Variable Speed Motor.

from the fact that the alternative of compounding necessitates the use of the higher pressures and consequently presents no hope of relief from boiler troubles. The Great Western Railway is fitting one of its Standard No. 1 boilers with the Schmidt arrangement, to see what advantage can be gained with the simple engine. Formerly the power of a locomotive was estimated largely from

A table is presented showing the dimensions of cylinders and diameter of driving wheels used in connection with the various boilers illustrated, to illustrate how much more heating surface is now provided for a given area of cylinder than used to be considered necessary. The higher pressures now common have undoubtedly produced much more efficient locomotives, both in respect of hauling power and coal consumption. This improvement has been very marked with every increment of pressure, right up to 227 lbs. carried by the De Glehn compounds. These have been most successful compounds, and the high pressure carried is no doubt an important factor. By employing 225 lbs. per sq. in. in the simple engine, and making the necessary improvements in the steam distribution, enabling higher cut-offs to be used, corresponding improvements in efficiency and economy of fuel have been obtained. Great increase in the drawbar pulls at high speed has also resulted. Of course, the price for these improvements has to be paid in the matter of firebox repairs and renewals, but it is probably better to submit to this expense than to employ the very much heavier and more costly machines which would be necessary to give the same hauling power at speed.

The Lincoln Variable Speed Motor.

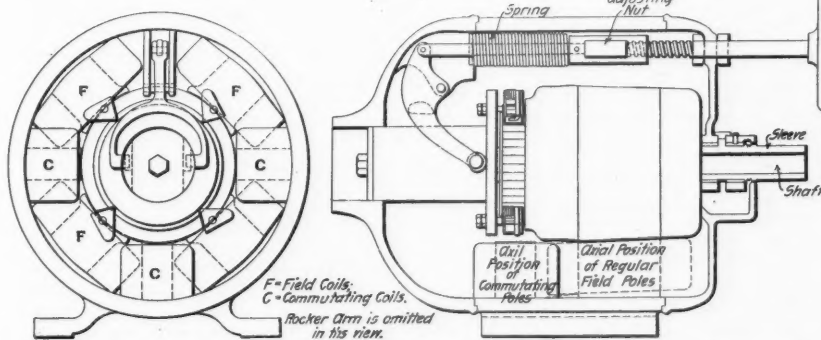
The Lincoln variable speed motor illustrated herewith is unique in its method of obtaining the speed variation, which, it is claimed, yields a much wider variation in speed than is possible by the ordinary method of field weakening. Motors with speed ranges up to 10 to 1 are regularly built. The method in question provides for the withdrawal of the armature from the influence of the field poles, thereby decreasing the field area and magnetic flux, increasing the air gap and resistance, and therefore increasing the speed.

The conical armature used, by a more rapid increase in the air gap, gives a greater increase in speed for a given lateral adjustment than is possible with a cylindrical armature. The horse-power of the motor is uniform, the torque varying inversely with the revolutions per minute.

To accomplish this, there has been perfected a thrust bearing that supports the commutator end of the armature, carrying an annular ball bearing to take both thrust and radial loads. This thrust bearing is actuated by a split lever having a central pull on opposite sides of the thrust bearing. Movement of the lever is accomplished by means of a screw mechanism and hand wheel as seen in the illustrations, a spring around the lever connecting rod being adjusted to balance the magnetic pull of the armature. The motor is a two-wire direct-current shunt-wound type, the same as any

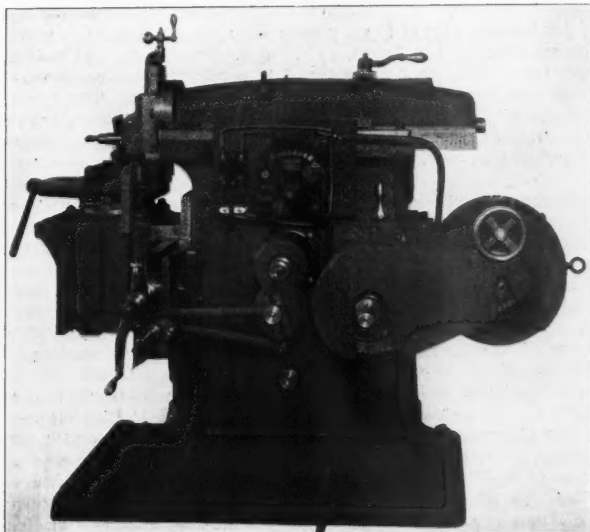
ordinary d.c. machine so far as installation is concerned.

This system admits of speed variation inside the motor, doing away with the electric controller with its complicated wiring, necessary to the ordinary method of speed variation by field weakening, and the necessity of finding room for its accompanying resistance. The speed variation is under the immediate control of the machinist,

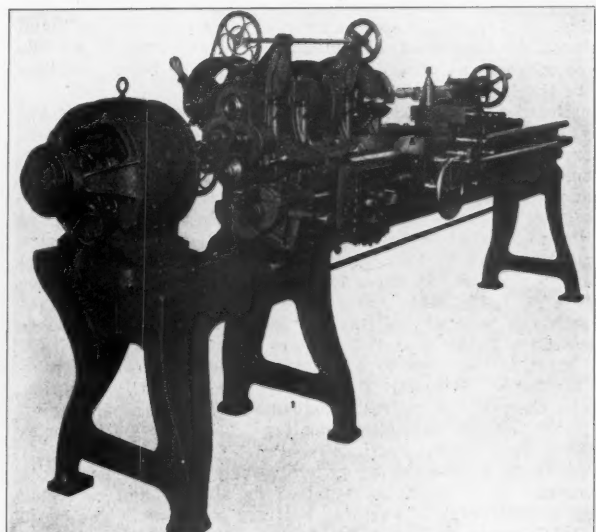


The Lincoln Motor Showing Method of Armature Movement.

the capacity of its cylinders, and this led occasionally to the use of cylinders of such dimensions that the boilers provided were not capable of generating sufficient steam to enable them to be worked at their maximum economical power for any length of run. To-day this is changed, and the first consideration is the capacity of the boiler.



Sixteen-Inch Shaper Driven by 2-H.P. 5:1 Lincoln Motor Showing Armature Moving Hand Wheel and Motor Starting Box.



The Lincoln Motor as Applied to an Old Lathe—Showing Method of Bringing Speed Control Close to the Hand of the Operator.

who with his eye on the tool and his hand on the regulating wheel can immediately increase or decrease the speed. Gradually he can increase the cutting speed up to what the work will stand, or with work of varying diameter keep his cut at the maximum speed throughout, without the abrupt changes liable to occur where a controller is used. It is so easily accomplished, it is claimed that a careful workman will make an involuntary saving on his product of 10 to 30 per cent. of the labor cost.

The efficiency is claimed to be high, comparing favorably with good constant-speed motors. Efficiency at full load on a 5-h.p., 5 to 1 motor is said to show by test from 86 per cent. at 300 r.p.m. to 75 per cent. at 1,500 r.p.m. Of quite as much if not more importance is the statement that it compares very favorably with good constant-speed motor practice in the maintenance of any given speed under varying load conditions—which is impossible with the ordinary method of field weakening by controller.

The perfection of this motor was attended with more than ordinary difficulty. Every feature—the thrust bearing, the special commutating field into which the armature is drawn at high speeds to insure sparkless commutation from no load to 100 per cent. overload, and the sleeve which carries the pulley or platon allowing the armature to slide through it in its lateral adjustment—was tested and tried for requisite efficiency before the motor was placed on the market. The makers claim that the motor will run in either direction with equal results. This is an important point of merit. A simple reversing switch is all that is required.

Views are shown of the application of the motor to machine tools. The lathe view shows a simple arrangement for bringing the speed control up to the hand of the workman. This arrangement costs between \$2 and \$3 complete. The motor on the lathe is one of the older styles. The view of the motor alone shows the latest style of motor, just perfected. The Lincoln Electric Manufacturing Co., Cleveland, Ohio, is the maker.

How Canada Regulates Its Railroads.

BY THE HON. A. C. KILLAM,
Chief Commissioner, Board of Railway Commissioners for Canada.

The Board of Railway Commissioners for Canada exercises authority over the railroad companies which are subject to the jurisdiction of the general Parliament of Canada, except Government railroads. We have a federal constitution under which a general Parliament exercises legislative authority over the whole Dominion of Canada, and Provincial Legislatures over the different provinces. In the division of legislative powers between these bodies, the Parliament of Canada is empowered to make laws upon the subject of railroads connecting one province with another or extending beyond the limits of any province and any others which are declared by the Parliament of Canada to be maintained for the general advantage of Canada, or for the advantage of two or more of the provinces.

Under this class of subjects the Parliament of Canada has incorporated many companies to build and operate railroads, and has authorized such building and operation usually by companies, but in some instances by the Government of Canada. It has also in many cases declared railroads built under authority of provincial legislatures to be works for the general advantage of Canada and has thereafter assumed legislative authority over them. Although the establishment of courts of civil and criminal jurisdiction and proceedings in civil matters are subjects of legislation by Provincial Legislatures, the Parliament of Canada has special power to provide for the establishment of additional courts for the better administration of the laws of Canada.

The Board of Railway Commissioners was constituted by the Railway Act of 1903, which came into force on the first day of February, 1904. The powers and duties assigned to the board are numerous and of varied character. Before building is begun, location plans must be approved by the board. Leave to cross highways or other railroads must be given by the board, and the board must determine what precaution, if any, shall be taken at such crossings, and whether they shall be made at grade or overhead or underneath. Lines or wires for telegraphs, telephones, for the conveyance of light, heat, power or electricity cannot be carried across railroads without the leave of the board, which establishes the precautions to be observed. Before a railroad is opened for traffic it must be inspected by an engineer, and its opening authorized by the board. Naturally the Railway Act deals with many details to be observed by railroad companies. The board is empowered to make general regulations dealing with many matters with which the statute has not specifically dealt.

The board is authorized, by general provisions, to order a railroad company to do anything required by statute, and to forbid the doing or continuing of anything contrary to statute. The board is made a Court of Record, and is given full jurisdiction to hear and determine all matters, whether of law or of fact; and, as respects the enforcement of its orders and other matters, it is given all such powers, rights and privileges as are vested in a Superior

Court. The decision of the board upon any question of fact is binding and conclusive upon all companies and persons, and in all courts. There may be an appeal from an order of the board to the Supreme Court of Canada upon any question of law, under certain conditions. An unlimited right of appeal from the board to the Governor-General in Council is given. The board may exercise its jurisdiction on complaint of any party interested, or it may, of its own motion, and is obliged at the request of the Minister of Railways to inquire into, hear and determine any matter or thing which, under the Act, it might inquire into, hear and determine upon application or complaint.

The rules of the board require applications and complaints to be made in writing and to be signed by the applicant or his solicitor, or, in the case of a corporate body or company, by its manager, secretary or solicitor. The application is required to contain a clear and concise statement of the facts, the grounds of the application, the section of the Act under which the same is made, and the nature of the order applied for, or the relief or remedy to which the applicant claims to be entitled. It has to be divided into paragraphs, each of which, as nearly as possible, is to be confined to a distinct portion of the subject, and the paragraphs are to be numbered consecutively. The application or complaint is to be endorsed with the name and address of the applicant, or, if there be a solicitor acting for him in the matter, with the name and address of the solicitor. In many cases it is required to be accompanied by maps, plans, etc. The applicant is to serve the application, and ten days are given for the respondent or respondents to answer it. The applicant may also reply to the answer. Any party is entitled to have a matter in which he is interested heard in open court, otherwise matters are frequently disposed of in an informal way by the board upon correspondence.

As the board has power to inquire into matters of its own motion, it is not strict in requiring applicants, and particularly illiterate persons, to conform strictly to such rules, but often calls upon a railroad company, upon a mere letter or informal complaint, to state its position.

Experts are appointed to advise the board, chiefly in engineering and traffic matters, and the board also has officials who inquire into accidents upon railroads, and it is empowered to require railroad companies to discharge employees responsible for accidents.

Tariffs of tolls for passenger carriage are divided into two classes: standard passenger tariffs and special passenger tariffs. Tariffs of tolls for the carriage of goods are divided into three classes: standard freight tariffs, special freight tariffs and competitive tariffs. All tariffs are required to be filed with the board, and are to be published in a certain way, unless otherwise ordered by the board. Standard freight and passenger tariffs are subject to the approval of the board. Special tariffs and competitive tariffs do not require the express sanction of the board, but must specify tolls lower than those in the standard tariffs. The competitive tariffs deal with the tolls to or from specified points which the board may consider, or may have declared, to be competitive points not subject to the long and short haul clause under the provisions of the Act. The board may disallow any tariff, or any portion of it, which the board considers to be unjust or unreasonable, or contrary to the provisions of the Act, and may require a company to substitute a tariff satisfactory to the board in lieu thereof, or may prescribe other tolls in lieu of those disallowed.

The classification of freight is subject to the approval of the board, and it is to be made uniform throughout Canada, as far as may be, having due regard to all proper interests. A company may, with the approval of the board, or when so directed by the board, place any goods specified by the board in a stated class, or remove them from any one class to any higher or lower class. There are the usual provisions against discrimination between persons or localities, and railroad companies are forbidden to charge any money for any services as common carriers except under the provisions of the Act.

There are also wide provisions regarding reasonable and proper facilities for traffic to be provided, and requiring the interchange of traffic between railroads. Companies whose railroads connect may be required to agree upon joint tariffs for a continuous route over both, and if they cannot agree upon the amounts of their rates and the division thereof, the board may determine the matters of difference.

The provisions requiring railroad tolls to be approved, and making them subject to revision by some authority, are not new. Such provisions have been found in all the railroad acts of Canada from 1851 down to the present time. Before the Act of 1903 the sanction of the Governor-General in Council was necessary, and tolls were subject to revision by the Governor in Council. There was a Committee of the Privy Council for Canada, known as the "Railway Committee," to which complaints and applications on many matters could be made, among which were complaints respecting tolls, discrimination, etc. A certain time was given, after the coming into force of the Act, for railroad companies to present their standard tariffs for approval by the board. Those which have been approved are practically similar to the tariffs that had previously been sanc-

tioned by the Governor in Council. The tolls provided for by these tariffs are generally used for local traffic for short distances, but most commodities are moved at rates provided for by the special tariffs, which the railroad companies may increase or decrease as they see fit, so long as they keep below the rates in the standard tariffs, and subject to the authority of the board to direct changes.

The following are some of the most important orders that the board has made since its inauguration upon the subjects of rates, facilities, etc.: An order requiring certain railroad companies to abolish discriminatory and prohibitive rates, which they had been in the habit of charging for years, on cedar lumber, cedar ties, etc., in order to keep down prices for their own construction purposes, and compelling them to make the rates uniform with those charged on other kinds of lumber, ties, etc. An order abolishing discrimination in rates on glass bottles from Wallaceburg, a point in the Province of Ontario, near Detroit, as compared with rates from United States points, and applying the same rates as from Detroit. Prohibitive rates on coopers stock to Montreal, for export, lowered; and an order made requiring coopers stock between local points to be carried on the same basis as ordinarily charged on lumber. Split peas, for export, directed to be reinstated in a list of articles in which they had formerly appeared, and which take the same rates as flour for export. An application by a railroad company for permission to make lower rates on coal to manufacturers than to dealers and ordinary consumers was disallowed. Rates on metallic shingles, which railroad companies had raised, were ordered to be restored to the former basis.

Export rates on cattle, which had been higher from points in the Province of Ontario than from points in the western states

traffic from certain lake ports eastward in order to meet what appeared to be unfair discrimination in the allotment of rolling stock.

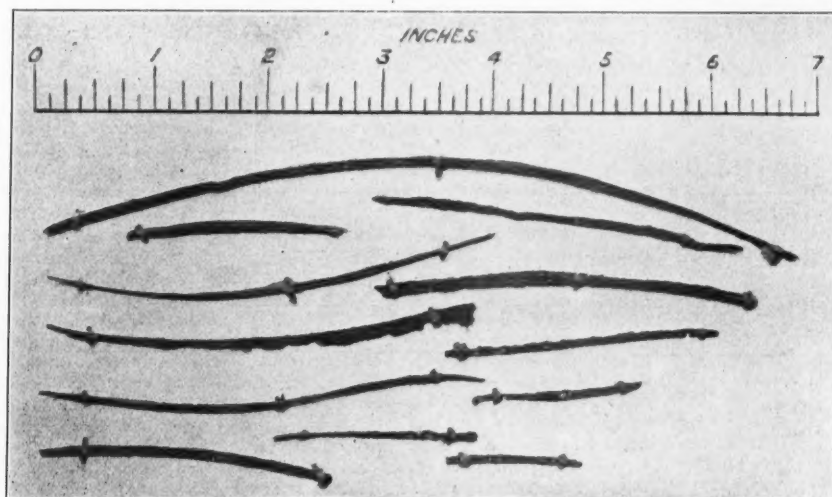
Under the provisions prohibiting railroad companies from charging rates not authorized by the Act, the board assumes to investigate claims of over-charge. Usually the railroad companies, upon notice of the complaint, settle the matter summarily to the satisfaction of the parties, or show that their charges are justifiable. This summary jurisdiction, exercised in this way, has proved most beneficial, as it enables parties to have their complaints speedily determined at slight trouble and expense.

Picked Up on the Road.

BY GULF.

I suppose there are very good reasons why the dining car service on some roads is on the *a la carte* plan while on others it is *table d'hôte*. Speaking personally, the former is exceedingly unsatisfactory where a comfortable dinner, promptly served, is desired. For lunch only, the *a la carte* plan will do. In first place it is much more expensive, and the variety that one can order is quite limited. The kitchen of a car is so small that whenever a few persons order simple repasts, the ranges are overloaded to such an extent that the delays are sure to be annoying. I was in a crack car the other evening and waited 25 minutes for a cup of cocoa, and that with the temperature of the car at 50. That the *a la carte* plan is not in favor with the public is shown, to my mind, by a comparison of two trains running out of the same depot and practically to the same destination a half hour apart in the evening.

One of these hauls an *a la carte* dinner and the other a *table d'hôte*. The latter is crowded so that there are people waiting, while the former is not half filled.



Slivers Cut by Switch Point from Steel Wheels.

were ordered to be lowered so as to be more in harmony with those paid by United States shippers. Railroad companies were ordered to discontinue charging higher rates on grain between local points than were charged on flour, etc. Rates on flour, etc., from points in the Province of Ontario to Montreal for export were lowered so as to do away with discrimination in favor of United States shippers from western states.

Rates on beans were lowered. The board determined that cartage allowances by carriers, to off-set disadvantages of location as between shippers, unless they are published in the regular tariffs and made general in their operation, should not be allowed. Railroad companies have been compelled to enter into joint tariffs with connecting railroads, although the rate was calculated to introduce competition with the local business of one company.

The board took into consideration the question of what are known as car service charges, and the rules regulating them, and prescribed an entirely new set of rules, after hearing from Boards of Trade and other interests in all parts of Canada, as well as the railroad companies. The board also proposes, under a special section of the Act, to prescribe forms of bills of lading, and the conditions on which goods shall be carried.

In some instances, the board has directed railroad companies, whose railroads connect with each other in or near a city or town, to interchange traffic so that shippers having immediate connection with only one railroad can have their goods transferred at the point of connection to the other line, and has fixed the rates for the short haul. In some cases companies have been given authority to meet the competition of local water carriers not subject to the Act, without publication of their rates, other than filing with the board, and to put them in force before the tariffs can reach the office of the board. The board also, in one case lately, made a temporary order as to the method of distribution of cars for

The loose wheel pops up perennially and apparently will not down. Years ago it was tried thoroughly, patiently and carefully, and results were obtained that were satisfactory mechanically, but the deep gulf that frequently lies between mechanical and commercial possibility prevented the passage from the former to the latter. In short, the advantages of the loose wheel in traction are not as great as one would be led to expect, but the field of invention and experiment is an attractive one. I suppose those who are ignorant of the failures of the past will continue to plough this well-tilled field for all time to come. As yet, the fruits have been disappointed expectations.

I had a rather startling and not altogether amusing experience on a Pullman car the other day. The conductor came into the car, and as he stopped I asked if he wanted the railroad ticket. "No, Pullman fare, one dollar," was the reply. I handed him the money and turned to my book. A few moments later he demanded my fare again, which I naturally declined to pay. He went away, but soon returned with a demand and a threat of ejection if I refused. I again protested, but he said he would give me a cash receipt and I could settle the matter with the company, giving me to understand that it would probably refund. So I paid my second dollar under protest. I then drew up a statement of the case which I proposed to submit and showed it to him. In about a half hour he came back and said that he had been counting his cash and found that he was a dollar over and so would refund. The amusing part lay in the assumption of unctuous virtue on the part of the men, who said that he always liked to be square and wouldn't keep money that he had obtained in that way, for, and here is the startling fact, "You never would have been able to get your money back, for the company would not refund, especially if I had not turned it in." The moral of which is, do not pay money to Pull-

man conductors unless you have one hand on the seat check, or unless there is a witness to the payment.

There seems to be one place at which there are really no bargains to be obtained, and that is in the domain of Nature. Somehow she demands an inexorable *quid pro quo*, and what you get in effect you hand out in power. Yet the struggle for the unattainable that we inherit from those who strove for perpetual motion still continues in the efforts to procure an abnormal development of power from microscopic appliances. Does it happen that a gentleman from Minnesota invents an engine that will develop ever so many horse-power, that can be carried in a lady's reticule; some eastern genius straightway eclipses the west by the invention of another engine that will develop ever so many more horse-power and which can be carried around in a man's watch pocket. This is the expected and regular course of events. The engine is built, particulars as usual still kept quiet. Then the people who put their thousands into the first engine usually throw up their hands, or perhaps they pull out their thousands. At any rate there never seems to be any extensive closing of the ordinary engine shops, or haste on the part of users to part with their present power plant at less than market figures.

Station signs are presumably for the benefit of the traveling public and serve to indicate to the stranger where he may be. Usually these signs are put in some definite position and there they stay regardless of the convenience of the people for whose benefit they are supposed to exist. Under the eaves of the roof of the station platform is probably the worst place. On the ends of the station does well provided there is a free approach and no obstructions. Where a building stands close to the station this location is about as bad as beneath the eaves. The curious part of it is that when the location has once been decided upon it becomes a law like unto that of the Medes and Persians that cannot be changed. There are exceptions, however, that serve to emphasize the prevalence of the rule. One of these rarities is to be found on a progressive road where the station sign was put on a signal tower a hundred and fifty feet away, which would otherwise have obscured it.

I was on a dining car the other day in which the General Passenger Agent had placed some fairly well mounted photographs of the scenery of the line, which the patrons of the car were at liberty to carry away. This suggests the query why the passenger departments of roads running through country of more or less scenic beauty have not made a more extensive use of the souvenir postal card. It seems as though for such a road doing a summer excursion business of any magnitude a card given by the ticket agent to the purchaser of each ticket would be sure to be sent to a friend who is thus made a possible traveler in the same direction. Such a card should be a true photograph and printed upon sensitized paper, thus bearing all the earmarks of genuineness and free from the atrocities that characterize the "Made in Germany" article. The cost of such a card would be insignificant and its value as an advertising medium considerable.

Washington Correspondence.

WASHINGTON, May 15.—When it has been finally passed by the Senate the Hepburn railroad rate bill will be a very different measure from that passed by the House of Representatives. The action of the Senate has shown that there was no foundation for the fear that was entertained in some quarters that the House bill would be emasculated and weakened at the Senate end of the capitol. Instead of being weakened and having its scope narrowed, it has been broadened and strengthened by the Senate amendments. The Allison amendments having to do with judicial review have not in any way subtracted from the powers conferred upon the Interstate Commerce Commission by providing in explicit terms for the review of its orders. Every power conferred upon the Commission by the House bill remains and the courts are given no more authority to review an order issued by the Commission than Mr. Hepburn and other champions of the House bill have contended was given by implication in the original draft of the bill. It is possible that the Commission may have been given more latitude in the making of rates by the striking out of the words "fairly remunerative," though no definite statement can be made as to this until the courts have passed upon the meaning of the requirement that rates made by the Commission shall be "just and reasonable." If a broad view of this language is taken by the courts a "just and reasonable" rate must be one that will be "fairly remunerative" to the carrier.

Of the many amendments adopted that were not covered by the Allison agreement practically every one is designed to broaden the scope of the bill in some direction. As it passed the House the bill applied to railroad corporations alone except when water carriers and rail carriers were under common control and management. Senate amendments bring within its scope all pipe lines crossing state lines, except those used for carrying water or gas,

all sleeping car companies, and express companies. The sleeping car amendment, taken in connection with the amendment requiring the giving of "equally good service and accommodations to all persons paying the same compensation for interstate transportation of passengers," may give rise to controversies involving the separate coach laws of the southern states, and, if they are held by the courts to require the giving of equal accommodations to white and colored passengers on interstate trains the result may be disastrous to the political future of some of the Senators from that section of the country.

The amendment designed to prevent railroad companies from engaging in the business of mining and selling coal or producing other articles of commerce is looked upon by many Senators as one of the most important of the amendments that have been adopted. There is considerable doubt among lawyers as to the constitutionality of this provision, so far as it may apply to railroad companies expressly authorized by their charters to engage in the mining of coal or in any other business, but if it is held to be unconstitutional the other parts of the law will not be affected. If it had been adopted as originally presented by Senator Elkins its effect would have been to bring about great confusion in the coal business, as it would have gone into effect at once, but, at the suggestion of Senator Dryden it was modified so as not to become operative until May 1, 1908, thus giving nearly two years for the railroads to dispose of their coal properties.

While the Hepburn bill does not undertake to change the provisions of the Elkins act, so far as they relate to the method of procedure for putting a stop to rebates and punishing the receiver as well as the giver, amendments adopted by the Senate propose to increase the severity of the penalties very much. Under these amendments, in addition to the penalties of the Elkins act, any official or employee of a railroad granting a rebate, concession or discrimination is liable to imprisonment for not more than two years, and the beneficiary of a rebate or other favor is liable to a fine of three times the value of the rebate or favor received.

The Allison amendment has been strictly adhered to by the Republican Senators, with the exception of Senator La Follette, who has not co-operated with any group of Senators on the railroad question. Every amendment embraced in that agreement has been carried through just as agreed upon, and the agreement to allow the words "in its judgment" to remain in the bill has been adhered to up to this time, though many Senators are of the opinion that they endanger the constitutionality of the entire rate-making provision. Senator Dolliver still insists upon the retention of these words, and he may be able to keep them in the bill by insisting that all those Republicans who were parties to the Allison agreement are bound to resist striking them out. There are Democratic Senators, however, who believe that the retention of these words in the bill will insure its being held to be unconstitutional, and a motion to strike out will probably be made by a Democratic Senator. Such a motion will embarrass those Republicans who believe that the elimination of these words is necessary to make the bill constitutional, and it may be that enough of them will vote for the motion to put it through.

The defeat of the Foraker amendment proposing to provide an alternative method of procedure by permitting proceedings to be commenced in the United States circuit courts in the first instance was a disappointment to those who believe that the rate-making feature of the Hepburn bill is fundamentally unconstitutional, and who hoped that this amendment would be adopted so as to insure effective legislation remaining on the statute books even if the courts should hold the grant of authority to the Commission to make rates to be unconstitutional. The defeat of this proposition was assured when it was not included in the Allison agreement, and it was impossible to secure its incorporation in that agreement because there are several Republican Senators who could not have been brought to support the agreement if it had embraced the Foraker proposition. Its introduction by Senator Foraker and his speeches on it may have good results, however, for if the Hepburn bill is held to be unconstitutional they will stand in the Congressional Record as indications of the line along which an effective and constitutional law can be framed.

Senator Lodge's proposition to increase the membership of the Interstate Commerce Commission to nine, and to fix the salaries at \$12,000, with \$12,500 for the chairman, aroused unexpected opposition to any increase in the commission or in salaries, and the Senate not only refused to adopt this but struck out section eight of the House bill which proposed an increase to seven members and an increase in salaries to \$10,000. Unless this action is reconsidered the bill, as it goes to conference, will leave the membership and compensation of the Commission just as at present.

J. C. W.

The French Minister of Public Works has recently called the attention of the railroads of the country to the desirability of equipping passenger locomotives with speed recorders. The companies have been directed to draw up a program for such an installation so that all engines in service may be equipped by Dec. 31, 1908.

GENERAL NEWS SECTION

NOTES.

During four days, May 4, 5, 6 and 7, the Canadian Pacific carried 4,850 immigrants from Montreal to Calgary, Alb.

At Roswell, N. Mex., a grand jury in the Federal Court has indicted the Pecos Valley & Northwestern Railroad for paying illegal rebates to secure shipments of wool.

The Atlantic Coast Line has given to the city of Florence, N. C., a tract of land embracing 137 acres and valued at more than \$10,000, to be used as the site of a state reformatory.

The striking longshoremen, pilots and other transportation men on the Great Lakes resumed work on May 10, an agreement having been reached between the proprietors and the workmen by which the differences which led to the strike will be soon settled.

A train load of bananas, consisting of 31 carloads, which started from Hoboken, N. J., on April 26, was run through to Minneapolis, Minn., about 1,344 miles, in 63 hours, or at the rate of 21½ miles an hour. The train was run over the Delaware, Lackawanna & Western, the Michigan Central and the Chicago, Milwaukee & St. Paul.

It is announced that the Grand Trunk is to abolish all of its fast freight lines except the National Despatch. The business of the other lines, the Commercial Express, the Lackawanna-Grand Trunk, and the others, all of which work east of Buffalo in connection with American lines, will be looked after by the officers and agents of the National Despatch.

Near Kamloops, B. C., on May 9th, an express train of the Canadian Pacific was stopped by robbers and the valuables in the registered mail department were carried off. The robbers cut off the mail car and hauled it forward a mile, and did not discover, until they had opened the car, that they had left the express car behind; and they apparently did not dare to go back to get it. It was reported the next day that the robbers had been caught.

Representative Mann, of Illinois, has introduced in Congress a resolution directing the Interstate Commerce Commission to investigate and report on the use of and necessity for block signals and appliances for the automatic control of railway trains in the United States; and in reporting, to recommend such legislation as may seem advisable.

English Investigation of Safety Appliances.

A committee consisting of Lieut.-Col. Yorke, chief inspecting officer of railways; Mr. Robert Turnbull, of the London & North-Western, and Mr. Richard Bell, M. P., has been appointed by the English Board of Trade to examine and test appliances designed to diminish danger to railroad employees.

Proposed Michigan-Superior Canal.

A bill has been introduced in the House of Representatives granting a franchise to Thomas Dolan, Jr., F. B. Sprague and others, to build a ship canal between Lakes Michigan and Superior via Whitefish river, Mud Lake and Au Train river and lake, in the state of Michigan.

Erie Canal Contracts.

Contract No. 8 for building part of the Erie Canal has been let to the Eastern Contract Co., Troy and Pittsburg, for \$1,433,817; contract No. 11, to the Fort Orange Construction Co., Albany, for \$1,359,475.

A New Westinghouse Company.

The Electric Properties Co. was incorporated under the laws of New York on May 10, with a capital of \$6,000,000 preferred and \$6,000,000 common stock. Its purpose is to acquire, finance and develop properties, especially electric power, traction and lighting undertakings. It owns the entire capital stock of Westinghouse, Church, Kerr & Co., and through that company will do general engineering and construction. No changes in the organization or personnel of the subsidiary company are intended. The new company will also make use of other engineering companies and consulting engineers when it is desirable.

John F. Wallace has been elected President and a Director. The other directors are: Charles H. Allen, Vice-President of the Morton Trust Co., New York; Paul D. Cravath, of Cravath, Henderson & De Gersdorff, New York; H. D. Giddings, New York; N. W. Halsey, of N. W. Halsey & Co., New York; George C. Smith, Vice-President of the Security Investment Co., Pittsburg; John A. Spoor, President of the Union Stock Yard & Transit Co., and President of the Chicago Junction Railway Co., Chicago; Moses Taylor, of Kean, Van Cortlandt & Co., New York; R. B. Van Cortlandt, of Kean, Van Cortlandt

& Co., New York; E. G. Tillotson, Vice-President of the Cleveland Trust Co., Cleveland, and F. D. Underwood, President of the Erie Railroad, New York.

Temporary Station at Forty-Third Street.

The architects of the new Grand Central Station, New York City, have filed with the City Building Department plans of the station which is to be used for passengers while the present station is being torn down and replaced. The temporary station is to be in the basement of the "Grand Central Palace" east of the present station and at the extreme eastern limit of the enlarged yard. The "Palace" fronts on 43d street on the south and Lexington avenue on the east. The rooms to be used for passengers are on the two lower floors, and the tracks will be 20 feet below the grade of Lexington avenue. The main waiting room will be 100 ft. x 200 ft., and this and the other rooms will afford about as much space as is assigned for the same purpose in the present station. The "concourse" between the head house and the tracks will be at what is now 44th street, and immediately north of this will be a cab stand, above the tracks. It is expected to occupy this building as a station for two years.

Decoration for Secretary Allen.

Mr. W. F. Allen, of New York City, Secretary of the American Railway Association, has received from the King of Belgium the decoration of Chevalier of the Order of Leopold. This honor is conferred in recognition of Mr. Allen's distinguished services as Secretary of the American Section of the International Railway Congress. The headquarters of the Congress are in Belgium. King Leopold by this act recognizes not only Mr. Allen's efficient management of the Sessions of the Congress in this country in 1905, but, as well, his prominence as a representative of American interests at the sessions of 1895 and 1900, held in Europe.

New Shops for the Coal and Coke at Gassaway, W. Va.

The Coal & Coke Railway has about completed its shops at Gassaway, W. Va., consisting of a steel frame machine and erecting shop, 192 ft. by 113 ft., with one 120-ton electric crane, 65 ft. long, with a traverse of 192 ft. in the erecting shop, with five-ton auxiliary hoists on each trolley, and a 10-ton traveling crane, 40 ft. long, with a traverse of the entire length of the machine shop, 192 ft.; brick paint shop, 50 ft. by 200 ft.; brick wood working shop, 50 ft. by 250 ft., with a 75 ft. transfer table, having a traverse of 320 ft. between erecting shop and wood working and paint shops; brick power house, 40 ft. by 60 ft., and coaling station. All the machinery is to be electrically driven, the large machines with individual drive. A store house, oil house and tin and upholstering shop are now being built. All the work is being done by company's forces.

Vox Populi.

Senator Dolliver, of Iowa, has shown his fellow congressmen a letter concerning the railroad rate bill from one of his constituents, an old farmer of Grundy County, which reads: "Don't never forget, my good senator, that we, the people, are keeping our eye on this thing down there. Settle it if you can, but for God's sake, senator, settle it right. Don't fix it so when it is all over we, the people, will have to bet under which shell we shall have to look for the goods."

The Earthquake on the North Shore Railroad.

A California signal engineer writes as follows: "The North Shore Railroad of California is a short electric third-rail line, running northward from Sausalito to San Anselmo. Sausalito is a harbor on the north side of San Francisco Bay. In 1903 thirty automatic signals were installed on this line, this being the first installation of signals controlled by alternating current track circuits. The signals are of the Union Switch & Signal Company's style "B" type, the company's standard electric motor semaphore, and they work by storage batteries placed in the lower compartment of the signal case. These batteries are charged through high resistance by current taken from the power rail. These signals did not suffer from the earthquake, except that one storage battery jar was broken, putting one signal out of service. The power went off at 5.13 on the morning of the 18th, from the fact that the Bay Counties' power system was put out of business by the earthquake, but the signals went immediately into service again when steam was raised in the North Shore power house, again supplying current. The ground around some of the signal foundations was sunk and disturbed.

"The ground around the new ferry building at Sausalito sank about a foot. The tracks and interlockings at Sausalito yard were put out of shape and along the road all bridges were thrown out of alignment and one large bridge was broken down. Incidentally, it is interesting to note that a little time before the earthquake, the signals at the entrances to a tunnel on the North Shore railroad

gave trouble from intermittent failures. After considerable search, a broken rail was found at the south portal of the tunnel, where there is a very sharp curve."

The writer of the letter speaks of the swishing wind during the earthquake, and says that an electric light in his bedroom glowed up a few seconds, although it was turned off. There have been other reports of similar observations.

A Roll of Honor.

On the Louisville & Nashville, "Brown's Discipline" has been in force for the last 10 years, and the officers' favorable opinions of the plan have been published in the *Railroad Gazette*. Mr. T. E. Brooks, Division Superintendent of the road at Birmingham, Ala., has lately issued the regular annual circular reporting the results of discipline for 12 months, and the list of names of men who come out with clear records is given in full. This is reprinted in the *Montgomery Advertiser* and takes up two columns of that paper. Besides trainmen, yardmen and station agents, the list embraces also the section foremen. Each man, who at the end of a year has less than 50 demerits on his record has 15 taken off; so that if he has only 15 he begins the next year with a clear record.

A Bit of Fatherly Advice.

The South Carolina Railroad Commission has sent a letter to President Spencer, of the Southern, complaining that on a majority of the mileage of its lines from Columbia to Greenville, Hodges to Abbeville, Alston to Spartanburg, Columbia to Charleston, Branchville to Augusta, and Kingville to the North Carolina line the rails are so light and the cross-ties so decayed that the roadbed is in no condition to stand the heavy rolling stock used and that this more than anything is responsible for the congestion of traffic and failure of trains to make schedule time. In view of the great increase in business afforded the road in the state the last five years the commission requests President Spencer to at once relay all of the main lines with heavier rails and otherwise build up and ballast the roadbeds for the safety as well as the facility of traffic.

The letter goes on to urge that the shop force be not cut during the summer, but run to their full capacity and on full time in order to prepare for the fall business, as "it is not so much the want of cars as increase in sidetrack room and in motive power that the business of our state is suffering from to-day."

The letter commended the work of the two superintendents working in South Carolina, and says: "Give them more yard and side-track room, allow them to increase their section force by paying full (more) wages; furnish heavier rails and sufficient locomotive power and we believe they can and will do the rest; and we will experience again no such conditions as obtained last winter."—*Richmond Leader*.

If an Agent Doesn't Make Good.

An agent or an applicant for an agency may consider himself capable of handling a station, and yet after taking charge find himself up against a stone wall which he is unable to break through. Inexperience, inability to procure proper help or an increase of business may be the cause of this. All who have been up against propositions of this kind know the feeling that is apt to get the better of the agent, and that it will grow as he gets farther behind with his work, causing the work to be more or less tangled.

In the face of such difficulties, give yourself a fair trial, take the matter up with the Superintendent, telling him the situation as it appears to you, and take the privilege, which is yours, of resigning and asking for something that you can hold. In this way a good record is retained, which is more than one could expect by hanging on until matters gets in such form that it will be necessary for the traveling auditor to make a transfer. After leaving, watch the outcome. If your successor takes up the tangled affairs and gets along all right, you must be lacking somewhere. If he does not and if more help is given him notwithstanding he is known to be a good, all-round man, your record is all the better.—*North-Western Bulletin*.

Manufacturing and Business.

J. W. Duntley, President of the Chicago Pneumatic Tool Co., sailed for Europe on May 3d.

The offices of Dodge & Day, Engineers, of Philadelphia, have been moved to 597 Drexel Building.

Robt. M. Burns & Co., Chicago, are delivering 20 steel tank cars to the Santa Fe Railroad to be used in construction work.

The Lehigh Valley Testing Laboratory has recently been given by railroad companies several contracts for testing cement.

Lewis F. Shoemaker & Co., Philadelphia, makers of steel buildings and bridges, have opened a branch office at 45 Broadway, New York.

J. H. Wynne, formerly Mechanical Engineer of the Illinois Central, has been appointed Western Manager of the Atlantic Equipment Co., Chicago.

The Independent Pneumatic Tool Co., Chicago, has moved its Pittsburg office from the Germania Bank building to the Farmers' National Bank building.

The Abner Doble Co., San Francisco, whose shops and offices were entirely destroyed by the fire, has temporary offices at 2611 Broadway, San Francisco. Work on new permanent shops in the Potrero district has begun.

The O. M. Edwards Co., Syracuse, N. Y., is building, in that city, a new factory which will have 100,000 sq. ft. of floor space, six times the size of the present main plant. It is expected to be finished about September 1.

Fairbanks, Morse & Co., Chicago, have recently sold a large number of their standard mine cars to the Republic Iron & Steel Company, Nassau Ore Company, La Rue Mining Company and the Rhodes Mining Company, for use in these companies' iron mines in Minnesota.

The Sullivan Machinery Co., Chicago, announces that its temporary San Francisco address is 1010 Washington street, Oakland, Cal., where it will carry an increased stock of rock drills and parts and air compressors. The company is prepared to give prompt attention to all business through H. T. Walsh, Pacific Coast Manager.

The Canadian Westinghouse Company, Ltd., has been given a contract for alternating-current single-phase equipment for about 35 miles of the Windsor, Essex & Lake Shore Rapid Railway Company. For the present, five cars equipped with two 100 h.p. motors each, will be operated; in addition to these, the order covers a 500-k.w., single-phase, 25-cycle generator.

Some rapid construction work is now going on at the new plant of the Lidgerwood Manufacturing Company, at Waverly, N. J. This plant is being constructed by the Miller-Collins Co., New York. The complete plant covers about nine acres of ground and the cost of the buildings alone will be \$500,000. When completed and equipped the plant will represent a total outlay of upwards of \$1,250,000.

The Arnold Company, of Chicago, Electrical, Civil and Mechanical Engineers-Constructors, heretofore located in the Marquette Building, has moved to the new Borland Building at the corner of La Salle and Monroe streets. This company is building the entire Elgin & Belvidere Electric Ry., a 35-mile interurban line forming the connecting link between two electric railway systems in northern Illinois. It is preparing plans and specifications for the buildings and entire equipment of the repair shops of the Kansas City Southern at Pittsburg, Kan. The company has also been retained by the Big Four as consulting engineers for new shops at Indianapolis. Some interesting work has recently been done in calculating first cost and economy which would result from the electrification of several steam road branches. It is doing the preliminary engineering and report work upon three large hydro-electric plants in Colorado, Utah and Idaho. One of these plants to be used as the source of power for the operation of electric "helper" locomotives on a heavy limiting grade of one of the mountain steam roads. The officers of the company are: B. J. Arnold, President; W. L. Arnold, Vice-President; Ralph J. Arnold, Secretary-Treasurer; George A. Damon, Managing Engineer.

Iron and Steel.

A number of small orders are being given daily for structural and fabricated steel for highway bridges, railroad turn-tables and extensions to manufacturing plants ranging from 25 to 200 tons, keeping the mills extremely active.

Orders have recently been given for rails to be delivered in 1907 by the Chicago, Milwaukee & St. Paul for an additional 10,000 tons, making an aggregate of 160,000 tons; and by the New York, Ontario & Western for 4,000 tons. The Boston Elevated has bought 1,800 tons, and the Ann Arbor 1,000 tons for delivery this year. Other large orders for next year are pending.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad conventions and engineering societies, see advertising page 24.)

Southern Agents.

The Local Agents' Association of the Southern Railway held its eighth annual meeting at Nashville, Tenn., May 8 and 9. Interesting papers were read by W. H. Tayloe, J. G. Mattison, L. L. McClesky, E. H. Shaw, F. B. Pelter, L. J. Duff, W. H. Gatchell, W. L. Pierce, E. H. Lea, J. N. Seale, H. E. Hutchins, and G. A. Barnes. All of these papers were in prose, and no poets were in attendance, so far as we can learn; but the poet of the *Nashville Banner* was

present, or near by, for we read in that paper that the meeting was fraught with great interest. In the evening following the convention there was a banquet at the Maxwell House; and then the members went home and freight box cars once more.

American Society of Civil Engineers.

At a meeting of this society May 16 a paper on The Scranton Tunnel of the Lackawanna & Wyoming Valley Railroad, by Messrs. George B. Francis and W. F. Dennis, illustrated with lantern slides, was presented. This paper was printed in the "Proceedings" for March, 1906.

International Railway General Foreman's Association.

The second annual convention of this Association was held in St. Louis, Mo., May 8-10, with a good attendance. The following officers were elected for the ensuing year: President, C. A. Swan, Jr. (C. & A.), Roodhouse, Ill.; Secretary, E. C. Cook (*Railway Journal*), St. Louis, Mo.

Engineers' Club of Philadelphia.

At a business meeting of this club to be held May 19 there will be a paper on the Water Works at Charleston, S. C., by J. W. Ledoux; also one on A Comparison of the Cost of Pumping Machinery, Driven by Steam and Oil Engines, by Francis Head. Both papers will be illustrated by lantern slides.

Society for the Promotion of Engineering Discussion.

The fourteenth annual meeting of this society will be held at Ithaca, N. Y., June 29 to July 4. This meeting will be held in affiliation with section D of the American Association for the Advancement of Science. Among the papers to be discussed will be one on Technical Books for Libraries. The present membership of the Association is 400.

Lake Superior Branch Engineering Association.

The Lake Superior Branch Engineering Association was organized at Fort William, Ontario, Canada, on Friday, May 4. The membership is made up of men directly engaged in the location and construction of the Lake Superior Branch of the Grand Trunk Pacific Railway. Meetings are to be held bi-monthly, when papers on engineering subjects will be read and discussed. The opportunity for social reunion is also one of the objects of the organization, as such gatherings are believed to be conducive to unity of opinion and purpose. At the first meeting Mr. A. Woods, Assistant Chief Engineer, made an address, and Geo. A. Knowlton, Division Engineer, was appointed Honorary Chairman. E. W. Cameron was made Secretary, and C. H. E. Rounthwaite, Treasurer. The business session was followed by a banquet.

Franklin Institute.

At a stated meeting of the Institute May 16, the program included papers on the Panama Canal, treating on the engineering and sanitary features by Dr. Henry Emerson Wetherill, of Philadelphia, also one on the Recent Earthquake in San Francisco by Messrs. Williams, Brown and Earle, illustrated with lantern slides.

At the meeting of the Electrical Section on May 17, the program included a paper on the Value and Design of Water Power Plants as Influenced by Load Factor, by Dr. Frederick A. C. Perrine, of New York. At the Mining and Metallurgical Section to be held later, a paper on methods of inspecting and testing railroad supplies by Robert Job, of the Philadelphia & Reading, will be presented, and at the Electrical Section, one on the Development of the Electric Furnace by Messrs. John Meyer and C. J. Russell, of the Philadelphia Electric Co., will be presented.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

Chicago Great Western.—H. Ernest, Freight Auditor, has been appointed Ticket Auditor, succeeding Otto Schaffer, resigned.

Missouri Pacific.—A. C. Bird, who has been in poor health for over a year, has had his leave of absence extended for six months further.

Pittsburg, Shawmut & Northern.—B. C. Mulhern, Trainmaster, has been appointed Superintendent, with office at St. Marys, Pa., succeeding A. M. Lane, General Superintendent, which title has been abolished.

Raleigh & Western.—The office of the President has been removed from New York to Cummock, N. C.

Operating Officers.

Alabama Great Southern.—R. E. Boswell, Superintendent of Transportation of this road and of the Cincinnati, New Orleans & Texas Pacific, has been appointed Superintendent of the Alabama Great Southern, with office at Birmingham, Ala., succeeding A. Griggs, resigned. E. C. Tomlinson succeeds Mr. Boswell as Superintendent of Transportation of both roads, with office at Cincinnati, Ohio.

Birmingham & Atlantic.—O. F. Pattberg has been appointed Assistant General Manager, with office at Talladega, Ala.

Boston & Albany.—N. Wales, Assistant Superintendent at Springfield, Mass., has resigned, effective June 1.

Cincinnati, New Orleans & Texas Pacific.—See Alabama Great Southern.

Grand Trunk.—S. Ennes, Trainmaster at Durand, Mich., has been appointed Master of Transportation, with office at London, Ont., succeeding Frederick Price, transferred.

Traffic Officers.

Lake Shore & Michigan Southern.—The office of the Chief Assistant General Passenger Agent has been moved from Buffalo, N. Y., to Cleveland, Ohio.

Engineering and Rolling Stock Officers.

Bessemer & Lake Erie.—E. J. Randall, Principal Assistant Engineer, has resigned. F. R. Layng, Engineer of Bridges, succeeds Mr. Randall, with the title of Engineer of Track. H. H. Harman has been appointed Acting Engineer of Bridges, succeeding Mr. Layng. The offices of both are at Greenville, Pa.

Pennsylvania.—F. T. Hepburn, Assistant to the Principal Assistant Engineer at Altoona, Pa., has resigned, to become General Manager of an electric railroad.

Pennsylvania Lines West.—N. M. Loney, Assistant Master Mechanic at Fort Wayne, Ind., has been appointed Electrical Engineer of the Northwest system, with office at Fort Wayne, Ind., succeeding A. C. Davis, transferred.

Purchasing Agents.

Grand Rapids & Indiana.—Henry Sullivan, Paymaster, has been appointed Purchasing Agent, with office at Grand Rapids, Mich.

LOCOMOTIVE BUILDING.

The Wisconsin Central, it is reported, is in the market for 15 or more locomotives.

The Mobile & Ohio has ordered 10 locomotives from the Baldwin Works. The special equipment will include Barber trucks.

The Butte, Anaconda & Pacific has ordered two switchers, two Decapods and two Consolidation locomotives from the American Locomotive Co.

The New Orleans Great Northern, it is reported, has ordered 12 locomotives, six from the Climax Manufacturing Co. and six from the Baldwin Works.

The Royal Siamese State Railways are asking bids on nine passenger locomotives and seven freight locomotives, including spare parts. Bids will be opened at 10 a.m., Sept. 12, 1906. Further information can be obtained from the Siamese Legation, Washington, D. C.

The Lima Locomotive & Machine Co. report the following orders for Shay locomotives for the week ending May 12: Stacey E. Wright, Getchell, Wash., one 10-ton locomotive; Fall Lumber Co., Colfax, La., one 28-ton locomotive; Sulphur Lumber & Timber Co., Winnefield, La., one 33-ton locomotive; Sligo Furnace Co., Sligo, Mo., one 65-ton locomotive; the Consolidated Lumber Co., Elk, Wash., one 23-ton locomotive; Standard Lumber & Shingle Co., Green Spur, Wash., one 45-ton locomotive; Ed Rand Lumber Co., Alexandria, La., one 37-ton locomotive; Dry Fork Lumber Co., Lanesville, W. Va., one 37-ton locomotive, and the Horse Shoe Lumber Co., River Falls, Ala., one 17-in. x 24-in. 10-wheel locomotive.

The Minnesota Transfer, as reported in our issue of May 11, has ordered five simple switching locomotives from the American Locomotive Co., for September delivery. Three of these locomotives will each weigh 130,000 lbs., one will weigh 138,000 lbs., and one will weigh 119,000 lbs. The cylinders of the 130,000-lb. locomotives will measure 19 in. x 26 in., and the cylinders on the other two locomotives will be 20 in. x 26 in. The diameter of drivers on four of the locomotives will be 51 in., and on the remaining one locomotive the drivers will be 55 in. in diameter. The boilers will be of the extended wagon top type, with a working steam pressure for four locomotives of 180 lbs. per sq. in. and for one locomotive of 175 lbs. per sq. in.

The Queen & Crescent, as reported in our issue of April 6, has ordered two simple 10-wheel (4-6-0) locomotives for the Cincinnati, New Orleans & Texas Pacific, and one simple 10-wheel (4-6-0) locomotive for the Alabama Great Southern from the Baldwin Locomotive Works. The Cincinnati, New Orleans & Texas Pacific locomotives will weigh 122,000 lbs., with 84,000 lbs. on the drivers; cylinders, 19 in. x 26 in.; diameter of drivers, 68 in.; wagon top boiler, with a working steam pressure of 200 lbs.; heating surface,

1,953.85 sq. ft.; 244 Detroit steel tubes, 2 in. in diameter and 14 ft. 1 in. long; carbon steel firebox, 108 in. x 43 in.; grate area, 32.2 sq. ft.; tank capacity, 5,000 gallons, and coal capacity, 9½ tons. The Alabama Great Southern locomotive will weigh 172,000 lbs., with 130,000 lbs. on the drivers; cylinders, 20 in. x 26 in.; diameter of drivers, 69 in.; wagon top boiler, with a working steam pressure of 200 lbs.; heating surface, 2,818.5 sq. ft.; 336 Detroit steel tubes, 2 in. in diameter and 14 ft. 11 in. long; carbon steel firebox, 102 in. x 66 in.; grate area, 44 sq. ft.; tank capacity, 6,000 gallons, and coal capacity, 12 tons. The special equipment for both includes: Westinghouse air-brakes, Simplicity bell ringer, Buffalo brake-beams, Tower couplers for Cincinnati, New Orleans & Texas Pacific locomotives, and McConway & Torley coupler for Alabama Great Southern locomotive; Pyle-National electric headlights, Monitor injector, Jerome piston and valve rod packings for Cincinnati, New Orleans & Texas Pacific locomotives, and U. S. piston and valve rod packings for Alabama Great Southern locomotive; Hayden safety valve, Chicago sight-feed lubricators, Pittsburg Spring Co.'s springs, Ashton steam gages and Gold steam heat equipment.

CAR BUILDING.

The Canadian Pacific, it is reported, is in the market for 50 steel hopper cars.

M. H. Treadwell & Co., Lebanon, Pa., is asking prices on material for 300 cars.

The Schenectady Railway (Electric) will soon order additional passenger equipment.

The Norfolk & Western, it is reported, will shortly order 500 stock cars and nine mail cars.

The Cincinnati Northern Traction has ordered 20 open cars from the Cincinnati Car Co., for June delivery. The special equipment includes: Westinghouse brakes, Curtain Supply Co.'s curtain fixtures and Elliott trucks.

The Royal Siamese State Railways are asking bids on 67 passenger cars, seven guards and luggage vans, and 265 goods wagons. Bids will be opened at 10 a.m., Sept. 4, 1906. For further information address Siamese Legation, Washington, D. C.

The Athens Electric Railway has ordered two 12-bench Narragansett cars from the American Car Co. These cars will weigh 19,000 lbs., and measure 34 ft. ¾ in. long and 8 ft. 3 in. wide, over all. The special equipment includes: Christensen air-brakes and Brill trucks.

The Ann Arbor since January 1st has built at its Owosso, Mich., shops twenty-six 36-ft. box cars of 80,000 lbs. capacity and five cabooses, and has under construction two 65-ft. combination mail and passenger cars. The American Palace Car Co. has ordered two cars from the St. Louis Car Co., to be operated over this line.

The Denver City Tramway has ordered 15 trailer cars from the Woebler Bros. Car Co., for July 10 delivery. These cars will weigh 13,000 lbs. and measure 38 ft. 1 in. long and 8 ft. 2 in. wide, over all. The special equipment includes: Westinghouse brakes, "Tomlinson" automatic couplers, Forsyth curtain fixtures, Pantasote curtain material, Woebler steel arch-bar trucks and Griffin wheels.

The Norfolk & Western has ordered 500 steel frame stock cars of 80,000 lbs. capacity from the South Baltimore Steel Car & Foundry Co. These cars will weigh about 38,000 lbs., and measure 35 ft. 11¼ in. long, 8 ft. 3¾ in. wide and 8 ft. high, inside measurements. The special equipment includes: Westinghouse brakes, Ajax brasses, Butler draft rigging, American Railway Steel-Spring Co.'s springs and Barber trucks.

The New York City Railway has ordered 43 double-truck closed type cars from the J. G. Brill Co., for September, 1906, delivery. These cars will measure 36 ft. long by 7 ft. 6 in. wide by 11 ft. high over all. The bodies and underframes will be of wood. The special equipment includes: Sterling brakes, electric heating system, Monitor roofs, Perforated Veneer seats, Brill trucks and National Car Wheel Co.'s wheels.

The Harriman Lines have ordered six postal cars for the Union Pacific and three postal cars for the Oregon Short Line from the Pullman Co., for September delivery. All cars will weigh 101,500 lbs., and measure 60 ft. 7¼ in. long, 9 ft. 8 in. wide and 14 ft. 1½ in. high, over all. The special equipment includes: Diamond special brake-beams, Christie brake-shoes, Janney couplers, Symington journal boxes, Pintsch light and Pullman dummy vestibules.

The San Francisco, Oakland & San Jose is building 10 coaches at its Oakland, Cal., shops, for September delivery. These cars will weigh 40,000 lbs. and measure 44 ft. 2 in. long, 8 ft. wide and 8 ft. 7½ in. high, inside measurements. The special equipment includes: Diamond special brake-shoes, Westinghouse brakes,

Gould couplers and platforms, Curtain Supply Co.'s curtain fixtures, Pantasote curtain material, Adams & Westlake door fastenings, Low Bros.' paint and Midvale wheels.

The Western Maryland has ordered 700 steel hopper cars of 100,000 lbs. capacity from the Pressed Steel Car Co., for November and December delivery, as reported in our issue of May 11. These cars will weigh 37,500 lbs., and will measure 32 ft. 3 in. long by 10 ft. 1¾ in. wide by 10 ft. high, over all. The special equipment will include: The Pressed Steel Car Co.'s axles, doors and wheels; Scullin-Gallagher Iron & Steel Co.'s bolsters, Damascus Brake-Beam Co.'s brake-beams, Pittsburg Brake-Shoe Co.'s brake-shoes, Westinghouse air-brakes, National Supply Co.'s brasses, Climax steel couplers, Lind door fasteners, Farlow & Session draft rigging, Harrison dust guards, Symington journal boxes, Heath & Milligan tank, Railway Steel-Spring Co.'s springs and Barber trucks.

The Chicago, Rock Island & Pacific has ordered five observation smoking cars for October delivery and two dining cars for August delivery from the Pullman Co. The observation cars will be 72 ft. 6 in. long, over sills, and the dining cars will be 70 ft. long, over sills. The special equipment for both includes: Pullman steel axles, National-Hollow brake-beams, Streeter safety brake-shoes, Magnus brasses, Janney couplers, Forsyth curtain fixtures, Pantasote curtain material, Waugh draft rigging, Pullman and Safety heating system, Symington journal boxes, Pintsch light, Murphy paint, Railway Steel-Spring Co.'s springs and Pullman trucks and vestibules. Other specialties are: Chaffee centering device, Acme diaphragms, attachments and curtain rollers, and Woods roller side bearings.

The Boston & Worcester Street Railway has ordered six semi-convertible cars from the J. G. Brill Co. These cars will have a seating capacity for 60 persons. They will weigh about 6,500 lbs. empty, and will measure 53 ft. 5¼ in. long over all by 8 ft. 2 in. inside by 8 ft. 1½ in. high inside. The bodies will be all wood and the underframes will be of both wood and metal. The special equipment will include Brill steel bolsters, Brill non-chattering brake hangers, General Electric Co. semi-automatic air-brakes, Van Dorn couplers, National Lock Washer Co.'s pinch handle curtain fixtures, Consolidated Car Heating Co.'s trust plank pipe electric system, Brill journal boxes, steel car type of Monitor top roofs, Brill 27-E-1½ special trucks, Railway Steel-Spring Co.'s steel tired wheels with cast-iron spokes, four GE-73 motor type M Sprague General Electric control. There will also be a special folding motorman's compartment in each vestibule.

The Denver, Northwestern & Pacific, as reported in our issue of May 4, has ordered 75 box, 75 stock and 50 flat cars, all of 60,000 lbs. capacity, from the Pullman Co., for September and October delivery. The box cars will measure 36 ft. long, 8 ft. 6 in. wide and 8 ft. high, inside measurements. The stock cars will measure 36 ft. 6 in. long, 8 ft. 4 in. wide and 8 ft. high, inside measurements. The flat cars will measure 36 ft. 8 in. long and 8 ft. 10 in. wide, over sills. The special equipment for all includes: Pullman axles, Commonwealth steel bolsters for box and stock cars and Enterprise steel bolsters for flat cars, Christie-Congdon brake-shoes, Westinghouse brakes, More-Jones brasses, R. E. Janney couplers, Positive door fastenings for stock cars, Security doors for box cars, Transom draft rigging for box and stock cars, and Republic friction draft rigging for flat cars, McCord journal boxes, Sherwin-Williams paint, improved Winslow roofs for box cars, Railway Steel-Spring Co.'s springs and Diamond arch-bar trucks.

BRIDGE BUILDING.

ALEXANDRIA, LA.—Bids are wanted May 22 by the Police Jury of Rapides, Paris, for building a steel bridge over the Bayou Boeuf.

BATAVIA, N. Y.—Bids are wanted May 19 by John Thomas, Supervisor, for building the steel superstructure and concrete flooring for the highway bridge over Tonawanda creek.

CHATTANOOGA, TENN.—Plans are under way for building a railroad bridge over the Tennessee river at this place, to cost about \$200,000. The project is in the hands of Theodore Crewdson, of Manchester, England, one of the stockholders of the Chattanooga Company, Ltd., who, in connection with the business men of this place, is planning to reach coal deposits.

HARRISBURG, PA.—Bids are wanted May 28 by the State Highway Department of Pennsylvania for building a reinforced concrete bridge in South Union township, Fayette County, also on the same date for a reinforced concrete bridge at Vienna Station in Donegal township, Washington County. Joseph W. Hunter is State Highway Commissioner.

LELAND, LA.—Separate bids are wanted June 30 by J. C. Haddin, Clerk of the Police Jury, for building for steel bridges.

LOUISVILLE, KY.—Bids will be asked for by the Board of Public Works for building an underpass 730 ft. long under the Louisville

& Nashville track, also one 837 ft. long under the Illinois Central tracks both in Oak street, Louisville. They are to be of reinforced concrete, with steel superstructures. J. P. Claybrook is City Engineer.

NEW YORK, N. Y.—The Board of Estimate and Apportionment has authorized an issue of \$2,000,000 corporated stock, to secure funds for building the memorial bridge at Spuyten Duyvil. The cost of the proposed structure will be about \$3,000,000.

PARKERSBURG, W. VA.—Definite arrangements have been completed for building the Little Kanawha bridge during the present year over East street.

STERLING, ILL.—A special election was recently held to vote on an appropriation of \$45,000 for rebuilding the Avenue G bridge, which was carried away by high water and ice last winter.

TACOMA, WASH.—Bids are wanted June 1 by the County Commissioners for building a combination wood and iron bridge 168 ft. long, over Carbon river, near Melmont, in Pierce County. I. M. Howell is County Auditor.

TOLEDO, OHIO.—Bids will soon be asked by the County Commissioners for building a steel highway and electric bridge 60 ft. wide to replace the present structure over Ten Mile creek at Detroit avenue.

WHEELING, W. VA.—Incorporation has been granted the Back River Bridge Co. to build a bridge from the corner of Zane and Huron streets, on the island, to the Ohio side across the Back river. The company has a capital of \$10,000. The incorporators are: L. F. Stifel, B. W. Peterson, G. O. Nagle and others.

Other Structures.

BEATRICE, NEB.—Work has been started by H. C. Wortham on the new Burlington station here, to cost about \$50,000. It is proposed to have the structure completed by October of this year.

DEVIL'S LAKE, WIS.—A contract has been given to Schmidt Bros. & Hill for building the new Great Northern works at this place. The buildings include one for offices, a boiler house and a machine shop, also a turntable. The cost of the improvement will be about \$160,000.

LEWISTON, ME.—The Lewiston, Brunswick & Bath Street Railway Co. is to put up a combined station and office building here.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

AMERICAN ASIATIC RAILWAY.—See Washington, Alaska Transportation Railroad Co.

ARGENTINE CENTRAL.—An officer writes that track has been laid for a distance of nine miles on the line which is being built from Silver Plume in Clear Creek County, Colo., via Waldorf to Johnson Ice Palace, about 13 miles. The work is through a mountainous country. The maximum grade will be 6 per cent. and the curvature 30 deg. There will not be any bridges or tunnels. (May 4, p. 136.)

ASHVILLE LOOP.—A charter has been granted this company in North Carolina, with a capital of \$100,000, to build a railroad 50 miles long. F. Culver and R. H. Kinkley, of New York, and W. B. Gynn are interested.

ATCHISON, TOPEKA & SANTA FE.—Under the name of the Liberal & Englewood, which was recently incorporated by this company, with a capital of \$6,000,000, an extension of its line is to be built west from Englewood, Kan., to Liberal, thence southwest through Beaver County, Okla., and west to Des Moines, N. Mex., and thence northwest to Raton, approximately 300 miles. Surveys have been begun for this line under the direction of Max L. Cunningham, of Oklahoma City. The line is being built to reach coal fields in the neighborhood of Trinidad, Colo.

BALTIMORE & OHIO.—The contract for improvements to this company's terminals at Brunswick, Md., has been let to F. H. Clement & Co., of Philadelphia, Pa. The new yard for the handling of east-bound freight will be west of the present yard, and will extend from Brunswick to Knoxville, between the main tracks and the Chesapeake & Ohio Canal. The work, which will be started at once, includes about 600,000 yards of grading, 3,500 yards of concrete masonry, and about 700 tons of iron pipe culverts. When completed this yard will have about double the present facilities, as it will have track room for about 7,500 cars. The cost will be between \$700,000 and \$750,000. About 32 miles of tracks will be laid and the main line tracks through the entire yard will be increased from two to four, the additional tracks being used exclusively for freight. Each track will be about two and a quarter miles long. The present main tracks through the yard will be used entirely by passenger trains.

This company is improving its Newark division by putting in

a third track from Central City, which is four miles west of Newark, Ohio, to Outville, and from Big Walnut, which is seven miles east of Columbus, to Summit. The contract has been let to Allen & Kefauver, of Washington, D. C., and the work will aggregate 14 miles. Between Central City and Outville, the third track will be used for westbound freight, and between Big Walnut and Summit for eastbound freight. On both these sections the grades are heavy. The work is being done to facilitate passenger service. This line is used jointly by the Baltimore & Ohio and the Pittsburg, Cincinnati, Chicago & St. Louis. The curves are to be reduced to a maximum of 1 deg., but no change will be made in the grades. The work is to be pushed to an early completion.

BALTIMORE, FREDERICK & HAGERSTOWN (ELECTRIC).—Contracts for the construction of 26 miles of a trolley line between Hagerstown and Baltimore, 78 miles, have been let to Westinghouse, Church, Kerr & Co., of New York City. Arrangements have also been made for a \$10,000,000 issue of first mortgage 5 per cent. bonds. The company has \$15,000,000 stock. It was incorporated several years ago. The contract let covers the section from Frederick to Hagerstown. As soon as this is finished it is proposed to build the rest of the line from Frederick to Baltimore, 52 miles. The whole line is to be completed and in operation within two years. There will be two tunnels, one at Braddock Height, about five miles from Frederick, which will be 4,000 ft. long, and the other at South Mountain, near Hagerstown, about 6,000 ft. long.

CANADIAN PACIFIC.—The various sections on which important track work is now under way are the Saskatoon east, the Strassburg north, the Winnipeg Beach, Teulon, Sheho, Wolseley-Reston, Saskatoon west, Wetaskiwin east, and the Medicine Hat sections. The Saskatoon east and the Strassburg north sections are being built by the British Columbia General Contracting Co., while the work on the Teulon, Winnipeg Beach, Sheho, Wolseley-Reston, Saskatoon west, Wetaskiwin east and Medicine Hat grade reduction work is being done by J. D. MacArthur.

CHICAGO, BURLINGTON & QUINCY.—A contract is reported let by this company to Kilpatrick Bros. & Collins for making new yards in Lincoln, Neb., also for rebuilding and double-tracking the line from that place west to Milford, 19.7 miles. The cost of the improvements will be about \$2,000,000.

CHICAGO, MILWAUKEE & ST. PAUL.—According to local reports this company has given a contract to Reynolds Bros. for building 160 miles of its Pacific extension in Montana. The contract is from Forsythe west to Harlowton, the junction point with the Montana Railroad. The work is to be completed in about one year.

CHICAGO, ROCK ISLAND & PACIFIC.—It is announced that the Rock Island, Arkansas & Louisiana, formerly the Little Rock & Southern, will be opened for traffic June 3 from Little Rock, Ark., south to Fordyce, about 50 miles. (See Construction Record.)

CLEVELAND, ASHLAND & MANSFIELD (ELECTRIC).—Incorporation has been granted this company in Ohio, with a capital of \$500,000, to build an electric railroad from Ashland, Ohio, southwest to Mansfield, about 15 miles. The incorporators are T. Farham, E. S. Avery and others.

DUBLIN & SOUTHEASTERN.—At a recent meeting of the directors of this company it was voted to extend the road south from Eastman, Ga., the present southern terminus, for a distance of about 35 miles either to Cordele, Fitzgerald, or Barrows Bluff. Preliminary surveys will be started at once to determine which route shall be followed.

GEORGIA, FLORIDA & ALABAMA.—This company, which operates a line from Carabelle, Fla., north to Cuthbert, Ga., and has practically completed a branch from Havana, Fla., to Quincy, 12 miles, has asked the city of Columbus, Ga., to which point it is building, to furnish land as a site for its terminals in that city.

GEORGIA NORTHERN.—An officer writes that the prospects of building an extension southwest to Monticello, 19 miles, are very good. The work will probably be done by the company's forces.

HOLSTON RIVER.—This company, incorporated some time ago to build a railroad from Rogersville, Tenn., northeast to Bristol on the Tennessee-Virginia state line, about 45 miles, has given the general contract to the Callahan Construction Co., and grading has been begun. A sub-contract has been let to J. R. Oates, of Ashville, N. C., for building about 10 miles of the road near Moccasin Gap. (See Construction Record.)

KANSAS CITY, MEXICO & ORIENT.—According to reports, this company is planning to organize a company to build a line from Altus, on the St. Louis & San Francisco and the K. C., M. & O., west to points in Greer County and southeast to Frederick, thence either to Wichita Falls, Tex., or Waurika, Okla. T., a total distance of about 100 miles.

LEWISTON, BRUNSWICK & BATH (ELECTRIC).—This company is

planning to lay several miles of second track in the cities of Lewis-ton and Auburn, Me.

LIBERAL & ENGLEWOOD.—See Atchison, Topeka & Santa Fe.

LITTLE FALLS & CANADA LAKES (ELECTRIC).—Incorporated in New York, with \$200,000 capital, to build street railroads. R. S. Starrs, S. R. Bestron and E. E. Wetherly, New York City, are incorporators.

LOUISVILLE & EASTERN (ELECTRIC).—Louisville and Indianapolis capitalists, it is said, have bought this road and increased the capital stock from \$350,000 to \$2,400,000. The increase in the capital was made to extend the line from Beard, Ky., northeast to LaGrange in Oldham County, and from Lakeland in Jefferson County east to Shelbyville, thence to Frankfort, also to build a line from the proposed extension at Shelbyville north via Eminence to Newcastle in Henry County, a total of about 75 miles. Percival Moore, who was Vice-President and General Manager of the old company, will be the General Manager for the new company.

MAINE & NEW HAMPSHIRE (ELECTRIC).—A company has been organized under this name at Portland, Me., to build an electric railroad from Standish south to Hollis, on the west side of the Saco river, about 10 miles. G. B. James, of Boston, is President; E. E. Hastings, of Fryeburg, Me., Clerk, and A. C. Kennett, of Conway, N. H., is Treasurer.

MATTAWAMKEAG & NORTHERN.—Incorporation has been asked for in Maine by a company under this name to build a railroad from Mattawamkeag, Me., which is on the Maine Central and Canadian Pacific, northwest to Millinocket, 22 miles. F. A. Greenwood and A. Wetherby, of Lincoln, are interested.

MISSOURI, KANSAS & TEXAS.—Contracts are reported let by this company to the Patton & Gibson Co., of Pittsburg, for reducing the grades to 0.4 per cent. on its line from Dennison, Tex., north to South McAlester, Ind. T., about 100 miles. The work calls for the handling of about 5,000,000 cu. yds. of earth, and must be completed by the end of 1907.

NEW YORK, CHICAGO & ST. LOUIS.—A contract is reported let by this company to B. F. Douglas, of Monroe, Ohio, for double-tracking the line between Cleveland and Lorain. The work is to be started this month and completed by the end of this year.

NORFOLK & WESTERN.—Contracts are reported let by this company for double-tracking 22.5 miles of its road between Concord and Forest, Va., as follows: W. H. Quigg & Co., Roanoke; J. R. Malone, Washington City; E. G. Nabe Bros. & Co., Portsmouth, Ohio; H. H. George, Jr., Richmond, Va., and G. W. Flickwir, Roanoke, Va.

PENNSYLVANIA LINES WEST.—An officer writes that work is under way as follows: On the Southwest system, completion of second track on the Indianapolis division from Columbus to Bradford, and on the Logansport division from Logansport to Chicago. The company is building a new eastbound yard at Cincinnati and is adding to the yard facilities at various other places. On the Northwest system, additional ore-handling facilities at Ashtabula and at Cleveland, and some minor grade changes on the lake lines; also engine houses and terminal facilities at various points are under way. The company is carrying out track elevation work at Cleveland, Chicago, Indianapolis and Cincinnati.

PHILADELPHIA & READING.—This company will, on May 27, open its "New York Short Line," extending from Newton Junction, Pa., to Neshaminy Falls, 10 miles. This line slightly shortens the distance over the Reading between Philadelphia and New York.

ROCK ISLAND, ARKANSAS & LOUISIANA.—See Chicago, Rock Island & Pacific.

SOUTHWESTERN TRACTION.—This company has been organized at Augusta, Me., with a capital of \$2,000,000 to operate railroads. I. L. Fairbanks, of Augusta, Me., is President and Treasurer.

UTAH & IDAHO.—Incorporation has been asked for in Utah by a company under this name to build a railroad from Provo, Utah, north through Utah, Salt Lake, Davis, Weber, Boxelder and Cache Counties to Logan, approximately 150 miles. The capital named is \$200,000, and it is estimated that the road will cost \$1,800,000. David Eccles is President; M. S. Browning, Vice-President; C. H. Kircher, Secretary, and H. H. Spencer, Treasurer. The office of the company is to be at Ogden.

VIRGINIA AIR LINE.—Under this name a company has been granted a charter in Virginia to build a railroad from some point on the Chesapeake & Ohio between Keswick and Gordonsville, Va., south to a point near Bremono on the James River division of the same road, about 30 miles, thence south an additional 30 miles to Farmville and probably to Danville. The track is to be laid with

85-lb. rails, and it will have low grades. T. O. Troy, of Amherst, is President, and J. M. Robertson, Charlottesville, Secretary.

WASHINGTON, ALASKA TRANSPORTATION RAILROAD CO.—Under this name a company has asked for incorporation in Phoenix, Ariz., to build a railroad from Nome City, Alaska, northwesterly to Cape Prince of Wales, for the northern division; from Nome City north-easterly to Council City, thence easterly to Koyukuk in Norton Bay; thence southeasterly up the Yukon and crossing it, to Tanana river; thence south to White Pass, crossing a portion of the Dominion of Canada to Skagway and Juneau; thence crossing Stikine river to Vancouver. The total length of line is approximately 2,000 miles. The project is believed to be that of the American Asiatic Railway.

RAILROAD CORPORATION NEWS.

AMES & COLLEGE.—See Newton & Northwestern.

ATLANTA & CHARLOTTE AIR LINE.—A stockholders' protective committee has been formed for protection when a readjustment is made next year for the refunding of the \$5,500,000 of bonds maturing then. The road is leased to the Southern for 7 per cent. on the \$1,700,000 A. & C. A. L. stock.

CANADIAN PACIFIC.—This company's sales of land during April aggregated 90,231 acres, at an average price of \$5.92. This is an increase of 68,041 acres as compared with April, 1905, when the average price was \$5.66. The greatest increase in sales was in the districts of Saskatchewan and Alberta.

See Delaware & Hudson.

CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS.—The Big Four Warehouse Co. has been incorporated with a nominal capital of \$5,000 to build a grain elevator for this road in Cincinnati.

BUFFALO SOUTHERN (ELECTRIC).—This company, which operates 21 miles of interurban road out of Buffalo, N. Y., and has outstanding \$447,200 capital stock and \$300,000 first mortgage 5 per cent. bonds of 1934, has been sold to Chicago capitalists. The controlling interest has been held by the Fidelity Trust Co., of Buffalo.

DELAWARE & HUDSON.—This company has arranged for trackage rights over the Canadian Pacific road from Adirondack Junction, Que., to Montreal, nine miles. Heretofore the D. & H. has run into Montreal over the Grand Trunk. The D. & H. will build from Rouse's Point, N. Y., on its own line, to Adirondack Junction, about 40 miles.

DETROIT TUNNEL CO.—This company, which is building the double-track tunnel under the Detroit river for the Michigan Central, has been authorized to issue \$15,000,000 bonds to reimburse the Michigan Central for the advances it will make to the construction company.

EXETER, HAMPTON & AMESBURY STREET RAILWAY.—A receiver has been appointed for this 21-mile road in New Hampshire. Its capital stock is \$275,000, and it has outstanding \$225,000 funded debt. It is controlled by the New Hampshire Electric Co.

MICHIGAN CENTRAL.—See Detroit Tunnel Company.

NEWTON & NORTHWESTERN.—This road, which runs from Newton, Iowa, to Rockwell City, 102 miles, has taken over the Ames & College, a two-mile road running from Ames, Iowa, to College, and having \$20,000 capital stock outstanding.

NEW YORK, NEW HAVEN & HARTFORD.—Gross earnings for the quarter ended March 31, 1906, were \$12,153,551, an increase of \$1,054,340; net earnings, \$3,053,721, an increase of \$1,350,558.

ONEONTA & MOHAWK VALLEY (ELECTRIC).—This company has been incorporated as a reorganization of the Oneonta, Cooperstown & Richfield Springs, which was recently sold under foreclosure, it having been in the hands of a receiver since July, 1903. It operates 68 miles of road between Oneonta, N. Y., and Cooperstown, Richfield Springs and Mohawk. There was outstanding \$1,464,000 capital stock and \$1,364,000 first mortgage 5 per cent. bonds of 1942. The new company is capitalized at \$1,800,000.

ONEONTA, COOPERSTOWN & RICHFIELD SPRINGS (ELECTRIC).—See Oneonta & Mohawk Valley.

PENNSYLVANIA COMPANY.—This company has sold to Kuhn, Loeb & Co. \$50,000,000 4½ per cent. 18-months' notes, guaranteed by the Pennsylvania Railroad Co. The notes have all been sold by the bankers at 99¾ and interest. The proceeds are to be used for the Pennsylvania Railroad's tunnels under the Hudson river and the East river at New York, and for cut-offs and improvements.

SPRINGFIELD & WESTERN (ELECTRIC).—The foreclosure of the mortgage securing the \$155,000 of first mortgage 5 per cent. bonds of 1921, the interest on which has been in default since June, 1905, has been asked by the New York Trust Co. The Springfield & Western is leased to the Dayton, Springfield & Urbana, one of the "Appleyard" lines recently sold.

